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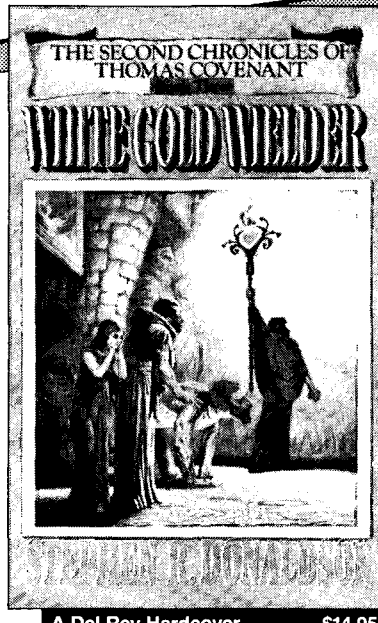

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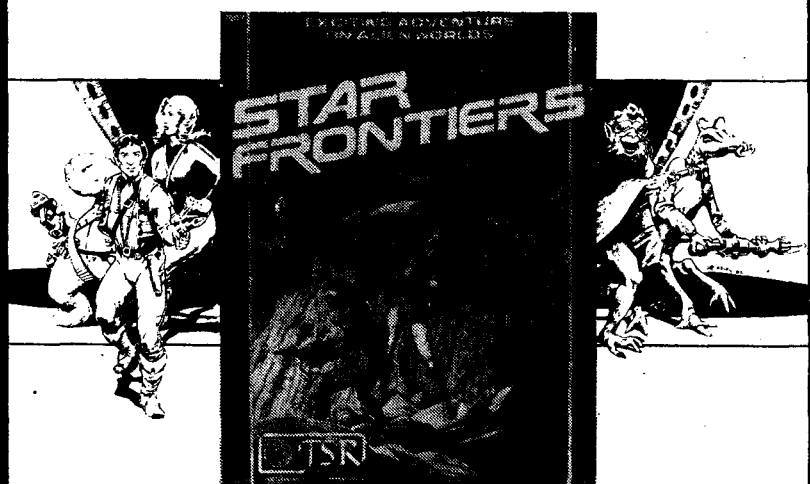

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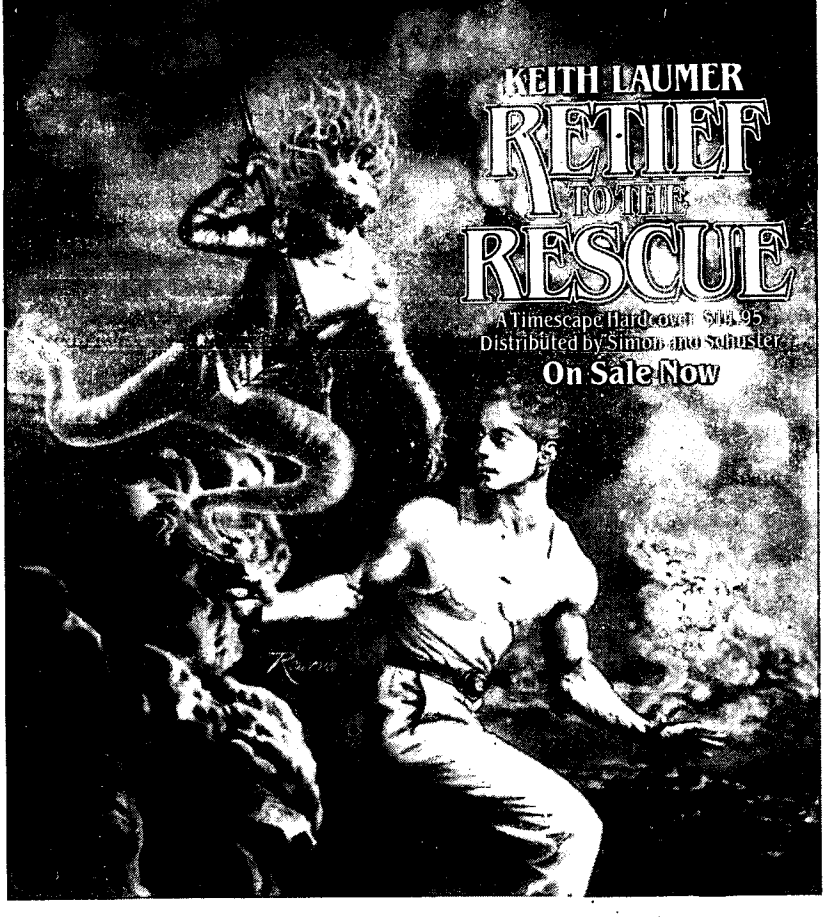

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Editorial

A Little Knowledge

Stanley Schmidt

There's an old saying that, "A little knowledge is a dangerous thing." What people repeating this usually have in mind, I think, is the danger of knowing enough to set a process in motion but not enough to control or stop it. Something like the Sorcerer's Apprentice—remember Mickey Mouse in a pointed hat, frantically trying to cope with broomsticks swarming up and down stairs with buckets of water to the music of Paul Dukas?

But there's another danger, too. A little knowledge can be a barrier to the acquisition of more knowledge which is needed—if people who have learned *some* begin to act as if they've learned all there is to know.

Elsewhere in this issue is an article by Joe Goodavage on "astrometeorology." Put simply, Goodavage's thesis is that weather on Earth can be predicted, with statistical validity at least comparable to that of conventional methods, by considering observed correlations of weather with astronomical configurations. Personally, I don't know how well his claims hold up; I haven't examined his numbers closely enough to be sure. Professional meteorologists tend to dismiss them as nonsense (without having examined them at all) because they know of no mechanism to produce the effects described. Obviously, they say, the other planets are much too far away to have terrestrial effects of the magnitiude claimed by Goodavage.

Well, that does *seem* to be the case. But just suppose, for a moment, that the correlations he claims to see are *real*. We *know* that conventional weather forecasts are pretty crude. Except in a few places like Phoenix, which have unusually simple weather patterns, their

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level of reliability is such that a dispassionate observer might marvel that we actually continue to pay for them. Yes, I use them, since I have nothing better at my disposal—but I have had many occasions to wish for something a lot better. The trouble seems to be that conventional weather forecasting is based on principles which we're pretty sure are sound, but they are applied to such complicated systems that rigorous calculation isn't (or hasn't been) practical. So, in practice, forecasts are based on empirical correlations with observed variables which seem clearly related to weather and have shown some correlation with the development of weather in the past.

Joe Goodavage makes his correlations with a different set of variables. His variables admittedly have less obvious connection with the direct causes of weather; he does not claim to understand why or how they correlate with weather patterns. All he claims is that they *do* show a correlation, and that that correlation leads to forecasts more reliable than those we are now using.

That claim should be relatively easy to test. Statistical correlations can be measured, and modern computers make the process relatively painless. Since it looks as if Goodavage's correlations *may* be valid, shouldn't somebody else be making these straightforward checks? If he's right, we *need* what he has. If he isn't, maybe if somebody shows him where he's wrong, he can either quit wasting his time or correct his errors and refine his methods so they work better. Any work of this kind needs feedback.

Surely the orthodox methods, as they now stand, leave plenty of room for improvement. I know that I, as a pilot, would like to have more confidence than I now do in the forecasts I get before a flight. If Joe Goodavage has a method that works well enough to warrant that increased confidence, I want to be able to use it—whether I know *why* it works or not. We can determine *how well* it works; if we establish that it *does* work, we can start using it now and figure out *how* it works later.

Not knowing the mechanism for an observed correlation between two sets of data does not prove no mechanism exists. It may instead point the way to a new area of research, containing principles not yet known. Scientific principles are discovered in finite numbers at a time. When scientists who have learned n of them become so arrogant or smug as to believe there can be no phenomena not fully described by those, they close the door to the discovery of the $(n+1)$st.

Astrometeorology is but one example of the problem; it may or may not prove to be a valid or important one. Variations of the effect abound in other fields, and some of them may be very important.

Consider psychology, for instance—a very primitive science (in the sense of "incompletely developed"), but nevertheless one in which people periodically propose "universal principles." Several years ago, my brother Dennis (not the science fiction writer) remarked, "What psychology needs is a Newton." I agreed, at the time, but I also agreed a few years later when he said, "I was

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wrong. Psychology isn't ready for a Newton yet. It needs a Tycho Brahe first."

Tycho's great contribution to astronomy, as you may recall, was to collect vast quantities of high-precision *data* on the apparent positions of heavenly bodies—*without preconceived notions of what they meant*. Only when enough data were in hand could Kepler conduct a meaningful search for precise correlations among them. And only after Kepler could Newton formulate the laws underlying those correlations.

And let's not forget that even a Newton may be succeeded by an Einstein who revises and extends those laws. And Einstein, in turn, by ————— ————. (Fill in the blank when history has progressed that far, which may well be while this paper is still fresh enough to write on.)

A similar progression may be necessary for the maturation of *any* science, "hard" or "soft." Indeed, the distinction commonly made between hard and soft sciences may be nothing more than a reflection of which ones have progressed to the Tycho, Kepler, or Newton stages of development.

Psychology is still waiting for its Tycho. Maybe the effort to formulate principles is premature. Maybe we first need a very large body of data covering all the variables that could, by any remotest stretch of the imagination, correlate with human behavior—not only physiological state and social environment, but things like atmospheric pressure and geomagnetic field variations and sunspot activity. Some of them may prove to have no correlation at all with human behavior—but let's *find out*, rather than guessing, and *then* try to formulate the relationships after we know which quantities are actually involved. Yes, there are oodles and oodles of variables—but large computers have made it possible

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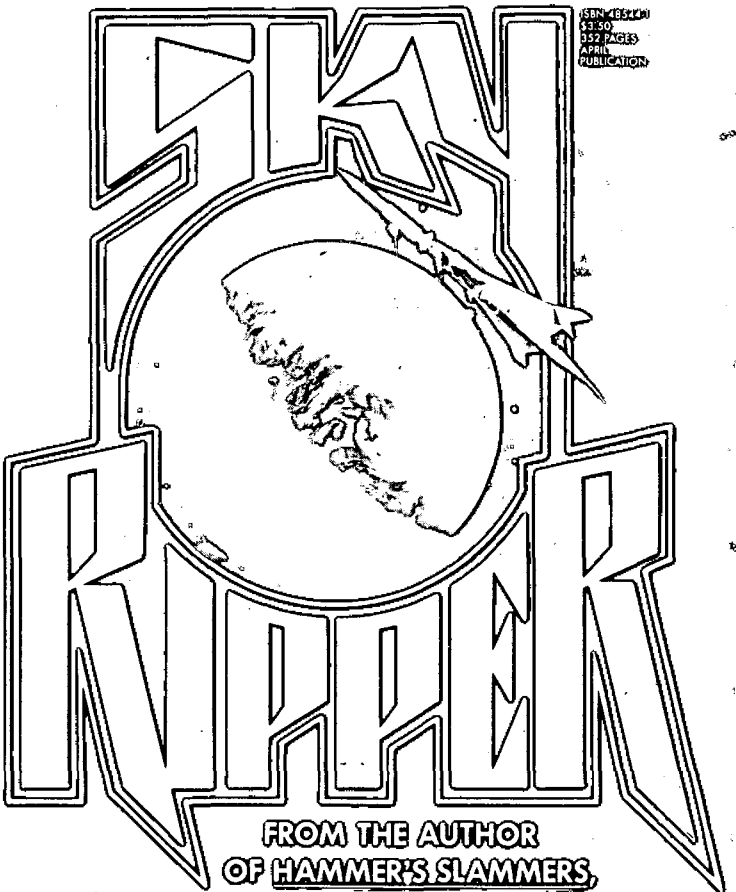

FROM THE AUTHOR
OF HAMMER'S SLAMMERS,
TIME SAFARI, AND THE DRAGON LORD:
A NOVEL THAT WILL HAUNT YOU.

BY DAVID DRAKE

TOR BOOKS
WE'RE PART OF THE FUTURE

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to work with large numbers of numbers and relationships, and that capability should be used wherever it can do something worthwhile. Even in a field as simple as physics, much of the important work of the last decade or so has centered on problems which just a few years ago were dismissed as too complicated ever to be analyzed in detail.

"Soft" scientists, perhaps unnecessarily embarrassed by the primitive state of their art, sometimes leap to the invention of some form of "pseudo-quantification." An academic colleague of mine once replied to the criticism that some standardized test results didn't really give a very meaningful measure of the skill they were supposed to gauge by saying, "Well, they're better than no numbers at all." Are they? Or might they be *worse* than no numbers at all? Once something is expressed—or claimed to be expressed—in numbers, people tend to assume it is Very Significant, whether it is or not. Students and their parents, for example, seldom seriously question whether numerical test results are founded on anything solid enough to *really* mean what they purport to mean.

And they may then base their actions—even ones with long-range consequences—on clumsily derived numbers rather than on their own (possibly better) judgment of the reality which the numbers are supposed to represent.

What we need, in any field I can think of, is large bodies of data of the kind that *can* be measured with a clear idea of just what is being measured. Then we can see what correlations really exist, and then—only when we're ready—formulate the underlying principles and quantitative measures for derived quantities like human aptitudes and tomorrow's weather.

The problem may be most acute in "soft" sciences, but the weather problem is a good reminder that even "hard" scientists are vulnerable. In fact, the "soft" sciences may have an advantage, of sorts, in having less temptation to think of themselves as complete and fully formed.

But anybody working in *any* scientific endeavor would do well to remind himself periodically that any time he becomes convinced that the knowledge he has is all the knowledge he needs, he's asking for trouble. ■

● No one imagines that a symphony is supposed to improve as it goes along, or that the whole object of playing is to reach the finale. The point of music is discovered in every moment of playing and listening to it. It is the same, I feel, with the greater part of our lives, and if we are unduly absorbed in improving them we may forget altogether to live them.

Alan W. Watts, *This Is It*

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HERITAGE OF FLIGHT

Susan M. Shwartz

There are certain acts which are commonly—and rightly—regarded as unthinkable. But suppose the only alternative is even worse. . . .

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The *Jeffrey Amherst* blasted off Cynthia and left behind the civs from Refugee Central. From here on in, until pickup sometime after the war ended, this would have to be their home. But the *Amherst* took Pauli Yeager's career as a pilot with it and left her behind, staring after it. The civs were settlers. But she, for all intents and purposes, was marooned.

Helping the settlers—the *other* settlers—set up their domes still left her plenty of mental energy for self-pity. Granted, Cynthia wasn't a bad planet. Counting New Patuxent, the base where Pauli had wanted assignment, it was the fifth she had seen. The sky was gray and cool. Delicate cirrus clouds flickered high within it and brushed across the peaks of nearby mountains. A wide, brownish river rolled not far from where the Amherst had landed. Near the river the sawtoothed ground cover, an unlikely combination of grass and leaves, was bright green. Farther out, away from the river, the scrub was grayish. There was a great charred patch where the ship had rested.

That splotch had caused a flap about Cynthia's ecosystem after liftoff. In addition, some of the civs hadn't wanted to crack out the domes because it might "damage the ground cover." But Captain Borodin had been diplomatic, reminding them that the children would need familiar housing until they adjusted to their new world. And the children were the settlers' major concern. For many of them, Cynthia was the first planet they might know as home—or the only one, if the war dragged on.

Captain Borodin was staying, too. The civs were even more wary of him than they were of Pauli. But that was mutual. Maybe Cynthia was their new home, but it had deprived Pauli of advanced training as a combat pilot on New Pax. That job too had been a compromise. She'd originally wanted Exploration, but with a war forecast, she knew she'd have no chance of that.

She could understand the civs staring at Borodin; he was a ship's captain suddenly detached from his ship. But she herself: it wasn't as if she were that odd. Certainly, she was slightly below average height. Most fliers were. She was slim, but very sturdy, and she wore her light brown hair in a tangle of curls short enough not to interfere with her flight helmet.

She was wasted on planetside duty, she judged. So did Borodin, who'd fought to prevent her assignment here. Pauli remembered how she'd heard Borodin and the Federal Security marshal assigned to the *Jeffrey Amherst* arguing, out where the ground scrub grew thickest. She had gone there to hide, hoping for time to get used to being marooned. She hadn't counted on becoming an eavesdropper.

"Yeager's got more potential than pilots' training would use," said the Federal Security marshal.

"Damn it, man, she's service to the core," Serge Borodin protested. "Her family's been service for generations. And she lives for flying."

"I know, I know. But we need that potential—her reflexes, the flair for math and spatial relationship—her genes—more than we do another pilot. Zero rate among new combat fliers has risen to 75% these days. We have to

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keep some of them alive. So she stays here.

"Look, Captain, these are the No Man's Worlds. Out here, we have to have people we can trust overseeing the settlers. Just look at them, will you? Alicia Pryor may be fine for a chief medic, but the rest of them—aren't they as unlikely a crew of theory-mongers as you'd ever want to meet? You heard that flap about the domes. They didn't want to tamper with the ecosystem, did they? When it gets cold, will they build fires, or weep about the trees?" The Fed Sec operative sniffed. "No. When we win this war and come back to pick up the refugees, we want to make sure we're getting back people we can trust. Which is why you're also staying on Cynthia, Captain. You'll have full military authority."

Pauli hadn't been able to see Borodin's face at that moment. She'd have liked to. She broke off her thoughts long enough to smile and thank a gamin-faced child who danced up to her and offered help. 'Cilla, the girl's name was. She had the body of an eight-year-old, but the eyes of an old woman who had seen far too much.

"My orders were cut for Novaya Moskva," Borodin had said with the mildness that generally heralded one of his more memorable rages.

Pauli heard a snap, as if the Fed Sec unsealed a message capsule. There was a long pause. Then Borodin suppressed an oath. "Thumbprint here, Captain. On the capsule. The message will dissolve after air contact." An even longer pause followed while Borodin read the message. It must, Pauli thought, be quite something to forestall Borodin's explosion. "Do you accept posting?" the marshal asked finally.

With the Secessionists busy grabbing planets, Borodin would either accept this assignment or face charges of sedition on the first world where the *Amherst* made planetfall.

"You're taking me off my ship," he said. "So I think that means that you owe me more than 'theirs was not to reason why,' Marshal."

"Captain Borodin, you're due for retirement in another year. Your reflexes are down, and you know it. Maybe you can still pass this year's proficiency tests. And possibly, just possibly, you'd last out your first scramble with a Secessionist ship. But what if you don't hit weapons or jump fast enough? We're out one very expensive ship and its expensively trained crew. We can use your skills—your command skills especially—better here."

"You think the war's going to be that rough, do you?"

"Why else do you suppose we're bothering to set up these settlements? If it were my choice, I'd intern these people, maybe set 'em down on Marduk's World. The whole southern continent's been turned into a hospital to tend the survivors of that first raid . . . and their children. Whatever they'll grow up like."

Both men fell silent, and Pauli winced. Marduk's World had been hit by old-style atomics.

"Even if we win," the Fed Sec continued, "we're not going to be able to count on having an undamaged gene pool to come home to. Did it ever occur to you, Captain, that—war or no war—we may all be defective? Since the

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Terra blockade, how can we even be sure what's standard human any more? Do you know what pure Terran stock is? This world's been listed as .8 G. Ever been on a perfect one-G?"

"But why must Pauli stay?" Borodin sounded like he fought a losing battle and knew it.

"Sorry. That's all the time I can spare for protest. I'm empowered to shift command to Commander Banez. She'll lift at 18:00."

His footsteps crunched away.

Well, Pauli, are you going to sneak and snivel till liftoff? Sarcasm had lashed her out of hiding to meet her captain's eyes.

"I tried, Pauli."

"I know, sir. It's TDY, isn't it?" Pauli tried to sound confident as they walked toward the work waiting for them. "It's just not all that temporary."

They helped unload crates of tapes and readers. Food concentrates for several years. A limited number of hydro canisters and tanks . . . they'd all have to turn dirt farmer! Pauli shook her head, appalled. She stared venom at the Security marshal's back. *Undamaged genes . . . racial survival, my backside,* she grumbled silently.

Lieutenant Raiford Adams came up. She'd been avoiding him all day. "Excuse me, Captain. Pauli, can I talk to you?"

"You're talking," she said. Rafe would probably like it here. Despite their commissions, xenobiologists were practically civilians themselves. Like the anthro officer, Ro Economus: she'd signed up for the service late. That explained why, at age thirty, she was still an ensign. But now they'd both be doing just what they'd entered the service for, while she . . . Pauli avoided looking at Rafe: tanned, the weathering carefully maintained under ship's UVs, reddish hair, rangy strength. He was lantern-jawed, pleasantly homely. All right, so pilots weren't supposed to become involved with anyone except other pilots. But Rafe had hoped to move into Exploration. So Pauli had thought things safe enough to plan and to dare other hopes. And on the strength of them, she'd made plans for a different future. . . .

Adams glanced desperately at Captain Borodin.

"Alone, if you don't mind, sir."

"What's to say, Rafe?" Pauli asked. "All my life, I've trained to be a pilot. And now I'm grounded. *You're* still a xenobiologist, but what am I? An exflier with great genes. Leave me alone, will you?"

Borodin jerked his chin at Adams, enforcing the suggestion, and the lieutenant left.

Liftoff came promptly at 18:00. They stared at the sky until the *Amherst*'s trail faded into the sunset. Two of the civs started building a fire. No one suggested breaking out the heatcubes. *Probably they don't want to waste power,* Pauli thought, remembering the Fed Sec's comments. Still, they had to have light. The children, 'Cilla especially, feared the dark. 'Cilla . . . they had found her in the wreckage of Scout Base Gamma along with her brother Lohr and a boy named Washington. 'Cilla and Washington still winced at sudden noises. Lohr, twelve years old with a dark,

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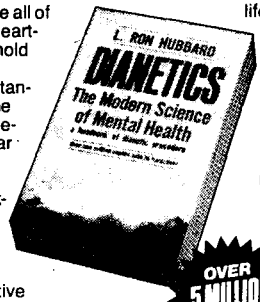

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clever face, was moody. He had stared at Captain Borodin until beckoned over. Now they were deep in talk about gliders.

"We've got two pilots, seeing as how Pauli's completed all but final training. But no ships. But, since we're a building sort of animal, we're going to make something to take the place of ships." Already Borodin seemed to be adapting to his new surroundings. "So we're going to build gliders like the ones I flew before I entered the service. Then all we have to do is find a high place, like up in those mountains, wait for an updraft, and step right off. Would you like to try it?"

Lohr followed Captain Borodin's hands as they described the flight of his hypothetical hang-glider. The boy's eyes were alight. *He'd have made a good pilot,* Pauli thought sadly. *But now? Mud farmer, grass-grower, hydroponicist at the very best . . . well, at least I'm pitying someone beside myself.*

Cilla edged up next to her, thrusting a scrap into her hands. Sketched crudely on it was a glider. *Talented child, perhaps. Were there plants among the supplies I unloaded?* Pauli thought. *Have to check.*

"Our resources are limited, Captain," Dr. Pryor said calmly. "We should not waste them on adventures, even camouflaged as scout trips. Besides, the gliders you describe are risky."

"Risky to careless people, Doctor," said Borodin. "None of my students are ever careless."

The blond, austere physician looked round the circle of civilians, then met Borodin's eyes somewhat quizzically. She wasn't about to be charmed, Pauli

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thought. Rafe tried to catch her eye and grin over Borodin's attempt. His sense of humor was part of what had drawn them together in the first place. But Pauli didn't feel like laughing with him tonight. *Good genes. As if I were just a set of chromosomes to be put in storage. Breeding stock, damn him.*

They might be stuck out in the No Man's Worlds, but Rafe had damned well better not presume on that.

After a moment, Rafe looked away. Then he rose to throw more wood on the fire. Sparks cascaded upward in a preposterously magical, comforting torrent. It was almost bright as noon. Even sullen Ayelet, one of twins, smiled. Her father, David ben Yehuda, looked up from the tiny engine he was stripping and froze.

"Hey!" he shouted. He jumped up and pointed at the night sky.

Enemy ships already? Longing for the weaponry of the *Amherst* and a good arms computer, Pauli leapt up. Instinctively her hand went for the sidearm that should have hung at her belt. She swore. She'd laid it aside in deference to civ opinion that the sight of weapons might interfere with the children's readjustment.

But it was not enemy ships.

High above the camp, hovering in the thermals that made the flames of their first fire dance, as if they had been lured away from the mountains by their flicker, was a splendor of immense wings.

'Cilla gasped, a sound more of wonder than of terror.

Rafe rose to his feet, his face stunned. Apparently, then, no one had expected to find such creatures on Cynthia.

They're huge, Pauli thought. But as they fluttered nearer, she saw that most of their size lay in the vast wingspread. The firelight and some bioluminescence in their pigmentation made them glitter with all the colors of deep space. Galaxies shone on their front wings, and on their scalloped, elongated rear wings whirled silver and violet nebulae.

They were fliers by birthright, not, like Pauli, to be grounded at someone else's whim. So they were wonderful. Grief, jealousy, and a sudden fierce love for the winged creatures warred within her. She looked over to see Ro and Rafe bringing out comm equipment which they patched in to the microcomp. This was precisely the sort of first-in work she and Rafe had planned to spend their lives at.

Pauli stopped long enough to pick up her weapon, then went over to join them.

"Look at the antennae on those creatures!" Rafe whispered. "Set the receptors for high frequencies."

Pauli made the adjustment.

"Their antennae are quivering," Rafe observed. "I wonder what they're saying about us." Rafe would welcome intelligent aliens to study. He craved them the way she craved a ship of her own.

"You wouldn't think anything that big could get off the ground," a civ muttered.

"Air pressure's heavier here," said Rafe. "And their bodies are probably a whole lot lighter than ours, even in this gravity. Chitin, not bone, for support material, maybe a more efficient circulatory system . . . there are all sorts of adaptations that can make a creature flight-worthy."

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"I read that in order for there to be intelligence, the brain has to weigh a certain amount," said ben Yehuda. Skilled with all forms of tools, a great reader, he was out of his depths here and knew it.

"Intelligence as *we* know about it," Lohr spoke up. Borodin concealed his surprise and ruffled the boy's hair approvingly. Dr. Pryor smiled. Of all the children, Lohr had been the slowest to make friends.

"Do you know why you're right?" Borodin asked the boy.

Lohr flushed at the attention and shook his head. He started whispering at 'Cilla, who was scribbling again.

"I'll tell him," Rafe offered. "Relatively speaking, the synapses in our brains are distant from one another. Move them closer together—pack them in, and make the other modifications that I suggested, and presto!" The children laughed at his imitation of a magician.

"That's how you might get one large, light, and presumably intelligent creature."

With wings. Since gravity was .8 of Terra-normal here, such a being would have less need of long runways and a high takeoff speed. Probably, given the updrafts in the mountains, such creatures could fall languidly into flight and soar for hours. When Borodin finished work on the gliders he planned to build, Pauli hoped that she could get into those mountains and see the Cynthians dancing in the winds of the high passes.

"We ought to move clear of the fire," she suggested. "If you remember, there were creatures on Terra that used to dive straight into flame. If these

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beings—wishful thinking aside—aren't really intelligent—"

"You think there might be a similar tropism?" Rafe looked up from his adjustments to the communicators' frequency. "They haven't tried it already. In fact, they've rather carefully stayed out of range, which makes me think that they've at least got survival instincts." He paused to consider. "Maybe you're right. If we move away from the fire, away from the camp itself, maybe they'll land."

He beckoned to Lohr. "Get me the spray canisters we stacked in the small dome," he asked.

When the boy reemerged with the canisters, Rafe examined them and nodded. He sprayed the first one. Sweet. The second was more pungent, underlaid with a sort of green fragrance. Tucking the canisters under his arms, Rafe moved out of the firelit circle. There was a story, Pauli remembered, an ancient one from the days before space flight, about humans who conversed with alien sailors by means of scents and powders. Was Rafe really going to try it? Let orange stand for pi, or vinegar represent Avogadro's number, or the square of the hypoteneuse, or something? Assuming these creatures even had mathematics.

Attracted by the scents, the Cynthians circled in. Pauli tested the catch on her holster, then helped Ro to carry the comms out beyond the fire. Then she waved the anthropologist back. In a settlement like this, a grounded pilot was more expendable than anthropologist.

"I wonder how long it'll take the microcomp to break their language patterns," she muttered.

"We'll be lucky if we can convince them to meet again and try to communicate," Ro said.

"Get the tapers. We're going to record," she told Lohr. Then she went back to watching the Cynthians' approach. They seemed to come in two sizes, one about a third larger than the other. "Move fast!" she hissed at the boy.

"They're going to stay," Rafe murmured. "Maybe those smells intrigued them."

Lohr and 'Cilla ran to Pauli with the recording equipment. The firelight cast gigantic rippling shadows of their running figures on the ground cover and high on the curved walls of the domes.

Two of the larger Cynthians detached themselves from the main formation and dived near the children. Their antennae quivered so fast that Pauli could barely see them. Iridescent heads lowered. Between the violet compound eyes, horns stiffened and grew bright with drops of some viscous fluid.

"Move very slowly," Pauli told the children. "Get back . . . right now."

In an instant more, she'd be able to draw . . .

"No!" Rafe shouted and leapt forward. "We're friends!" The lights on the comm danced a frantic pattern, while sounds squealed up painfully until they were too high-pitched for human ears.

Pauli rested her hands on the children's shoulders and walked them back to the fire. Dr. Pryor received them protectively.

"Pauli, get back here. They're going to land!" Rafe cried.

This time Pauli drew her weapon be-

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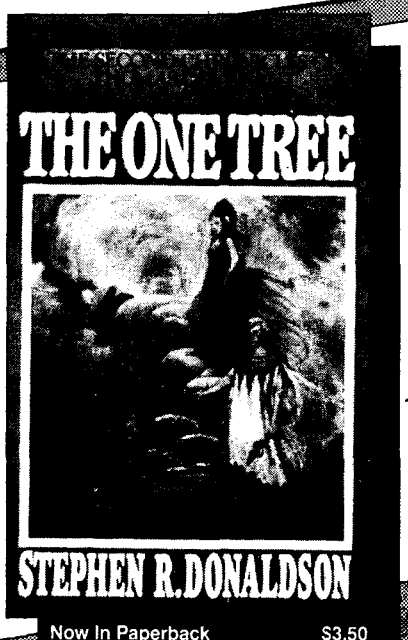

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fore leaving the fire. So did Borodin. The significance of those glistening horns hadn't escaped him. They had to be some sort of natural defense.

"Why must they automatically assume that these . . . flying things are hostile?" murmured a botanist. She had been especially opposed to military personnel's remaining on Cynthia.

Pauli wanted to snarl at her. But it was more important to get out there in the dark and help Rafe. He was hooking the comm gear to the microcomputer's readout. From time to time, squeals and screeches of static and flutters of dazzling wings showed the progress he made.

Finally he stood, weariness apparent in his stooped shoulders. The Cynthians took off and circled about the camp once before heading back toward the mountains.

"We can't just let them go!" Ro whispered.

"We won't," Rafe said. "They'll be back. They're just as curious as we are." He rubbed a spot on his back. "I managed to intrigue them . . . I think I did. We'll have the time we need to learn to talk with them."

After all, Pauli thought with a return to her former bitterness, *what else do we have to do?*

It took weeks even to work out a simple code, long frustrating evenings in which no one could tell what might send the Cynthians aloft and back to their mountains—the smell of cooking meat, perhaps, or a too-rapid movement by one of the settlers. Anything could jeopardize the fragile accord Rafe was building between himself and and the winged natives.

But he was gradually reporting progress, gradually moving out farther and farther from the camp to the Cynthians during their now-nightly conversations.

"The semiotic usage—their system of signs—is vastly different from ours, just as you'd expect," he reported. "No specific nouns and verbs; just concepts that can be used as either. Most of them have to do with flight . . . there isn't one for swimming. Which doesn't surprise me. They've got one for fire. It's semantically allied—do you see?—to their sign for destruction. Your analogy of Terran moths, Pauli . . ."

So it had been the fire that frightened the Cynthians that first evening? *Odd,* Pauli thought. *It seemed as if they feared the children.* But how could anyone fear children, especially those as badly traumatized as the ones here had been? Strange; she had always thought that one good way of establishing contact with aliens was through the young of each species.

"There's something that's been puzzling me," Rafe spoke up. "I want to get a sample of that fluid on their horns."

"Rafe, if they turn on you, we haven't got an antidote," Pryor warned him seriously.

"I think they'll trust me," he said.

"Cover him," Borodin mouthed at Pauli, who moved in.

"You'd better let me do it," she said. Rafe was too valuable to risk. Taking a slide, she dabbed with it at the horn of the nearest Cynthian, then leapt back before it could do more than rear up in surprise. She smelled it: dusty, like old

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leaves in the autumns on her homeworld . . . assuming her homeworld hadn't been charred until it no longer had autumns, or any other season. Some of the dust from the Cynthian's scales seemed to cling to the slide. Even as she watched, the horn went flaccid, the fluid it had secreted evaporating.

When she gave Rafe the slide for analysis, he stopped glaring at her long enough to process it. "Strong neural toxin," he announced. "Must be their major weapon. Their mandibles are imperfect; it's a wonder that they can eat at all. I'd say that their backup defenses are the barbs on their wings and those forearms. I imagine they'd use them to grasp an enemy long enough to shred its wings or brush it with their poison."

A Cynthian battle . . . horns glistening, winged Cynthians darting, dodging, reaching out with those hooks and claws . . . what a lethal, beautiful sight such a battle must be.

Pauli hoped she never saw one.

Rafe Adams stared at his printouts. Human/Cynthian equivalences . . . this world's Rosetta Stone. Behind him murmured voices, and sparks from the nightly fire crackled. The fire had turned into a ritual that comforted the entire settlement and drew it closer together. Pauli, too—they were working together, just as they'd planned. Only she was still reserved around him. Damn it, the woman would have to be crazy to think he liked being stranded here or to imagine that his delight at her presence here caused him anything but guilt. He hoped she'd come around.

After all, it might have been much worse. The settlement was beginning to pull itself together. So were the children at its heart. Today Ayelet had been a brat. So, on Borodin's orders, she had been sent into the dome to go to bed early. 'Cilla snapped at Lohr for spilling her paints. She was turning into the group's artist. Lohr had snarled back, and Dr. Pryor could scarcely conceal her exultation. After all, it was remarkable that children who had been brutalized as badly as these could make a fresh start. They were laughing more now, and losing the preternatural control and jumpiness that had made people nervous around them. Rafe decided that a lot of their adjustment was due to Pauli and the captain. Probably because they knew no other way of acting, they treated the children like cadets. Perform well, and they handed out rewards, chief among them work with the gliders. Shirk or act up, and there were punishments, like early bedtimes, no gliders—and no Cynthians. Rafe thought of the younger brothers he had had. *Had* was the operative word; his family had been on a station when the Secessionists struck it. And he had better not think of that again now.

Ben Yehuda grinned and waved at him, undisturbed by Ayelet's punishment. Rafe tossed more wood on the fire and settled down to wait. Pauli stationed herself at the comm. Soon the Cynthians would arrive.

Two in particular turned up every evening. Some odd whimsy of Pauli's made her dub them Uriel and Ariel. The names had stuck. Among the largest of the Cynthians, they were probably also among the eldest, assuming that the pallor of their fluorescent wing markings indicated age. Rafe chuckled, thinking

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of their keeping order among the younger, faster Cynthians just the way that the captain ran the settlement.

"Here they come."

"Ask if there's a cold season, and how they survive," suggested Borodin.

The question went into the common-coder and appeared on the readout as symbols: *cold / visualization of a Cynthian / interrogative.*

Antennae quivered. The screen blanked, then lit with the symbols of the Cynthians' reply: *mountains / hollowed-out caves / Cynthian, wings folded, within.*

At least their eyes perceived some of the same wave-lengths! Otherwise communication would have been even more difficult. The Cynthians hibernated, Rafe concluded from the sign on the readout. Not surprising.

But wait. Now new symbols were forming. *Cold.* The screen split into two displays, preparing for the analogical constructs that seemed to be a major characteristic of Cynthian "speech." *Cynthians / mountains. Humans / domes.* That was plain enough. Cynthians lived in the mountains; humans lived in the domes. The screen lit again. *Humans / mountains.*

"They're asking us to move," Rafe said.

"We can't," Beneatha, the xenobotanist, argued. "There's no way we can get the hydro tanks into those hills." Rafe wished that Beneatha were less hostile toward the military members of the group. He'd have liked to study the Cynthian diet, but Beneatha, the one time he had approached her, had been barely civil. Even to him—and Pauli had often accused him of being three-quarters civilian himself.

He looked over at her. She'd hoped to have earned her own ship by this winter, he knew. They had made plans for such a ship once. It would have been theirs. With a ship and membership in the Exploration arm of the service, they could have discovered planets like this one. But now, with the Secessionists grabbing undefended planets, Pauli would have been assigned a combat ship just big enough for one suicidal fighter. Granted, losing her chance to be a fighter pilot was bitter for her. But at least she was alive, and Rafe was glad of that. There had to be something wrong with a system that condemned its bravest, brightest young people to early deaths—and you didn't have to be a civilian to think that.

Rafe became aware that he had been quiet too long. People were staring at him. "I'll tell the Cynthians we can't join them in the mountain caves."

He selected his symbols carefully. *Domes / plants in rows. River / humans.* The humans had to stay where where they could find food, water, and shelter.

Ariel's antennae quivered and stiffened. The poison horns on its head extruded themselves, gleamed, then withdrew quickly. Wings flapped and scattered spangles of violent and silver across the night sky as it lifted. Why had Ariel fled the human camp?

"What did you say?" asked Pauli.

"That we had to stay where our home was."

Uriel—ink-blue body with pale-green and silver mottlings—wrapped its upper wings firmly about its body, indicating fear and distress. The screen filled with

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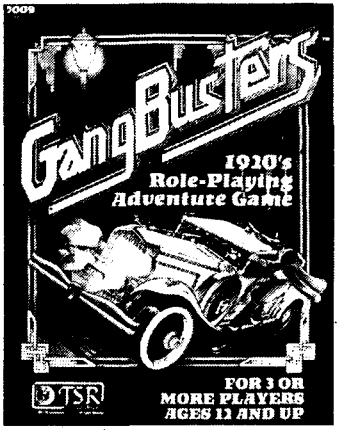

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the elder's message: *humans: caves . . . humans: caves . . . humans: caves . . .*

"Insistent, isn't it?"

Before Rafe could answer, Uriel also lifted away from the camp. The smaller Cynthians followed more slowly. Powder from their wings sprinkled down upon the watching humans.

Why would they want the humans to move up to their eyries? You'd think the Cynthians would be territorial . . . unless winged creatures weren't as turf-conscious as land-bound ones. If that were so, it would be the first case of non-territoriality Rafe had ever learned of.

I'd like to get into those hills, Rafe thought.

A hand fell on his shoulder. *Borodin.* "If you're thinking what I think you are, Lieutenant, forget it till we learn more about this planet. I'm not about to risk you."

"How about ground recon? Since you don't want me heading for the mountains, why not let me take a team into the river plain?"

"Fine. When do you want to leave?"

"Tomorrow, dawn?"

Borodin nodded. Rafe's glance slid over to Pauli. *Come with me? Please?* But she was watching the Cynthians. Rafe sighed, knowing that nothing he could give her would ever replace her lost dream.

He shrugged then, and went to choose the civilians and children who would come with him.

Carefully Pauli stored her glider away and started toward the dome they had designated as a dining hall. *Great flying weather,* she thought with satisfaction. The gliders gave her a dizzying sense of freedom. She loved the way the wind rushed against her eyes and forced tears into them, turning the patchwork land a green-blue. Risky, the civs clucked. Sure: but a one-man ship was riskier, and that was the ship she'd wanted.

Were any of her friends at New Pax or on board *Amherst* still alive? Involuntarily she glanced toward the plain in the direction Rafe and his scout team had taken. Maybe the war would end soon. Or maybe it would only end when no one was left with the strength to fight it.

Well, for her, the war was definitely over.

"I expected Lohr to join us today," Borodin commented as he put away his own glider. "He's been panting to try his wings."

"Lieutenant Adams convinced Dr. Pryor that his recon was a field trip, and so took priority over joy-riding," Pauli said. Her voice was harsh. "Frankly, what I think is that 'Cilla wanted to go, so Lohr went to watch out for her. You know how she runs on ahead. Besides, Ayelet was going, and Lohr likes her."

"That'll be useful to know in a couple of years when they all start pairing off," Borodin said. "Adams is doing fine work, don't you think?"

Speaking of pairing off, are you, Captain? If the captain wanted to praise Rafe, let him log a commendation into the microcomp.

As they came out of the dome, someone ran into Pauli, sobbing hysterically.

Ayelet! Several of the civs ran out to soothe her. Was Rafe's expedition aborted so soon? Where was Adams?

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Pauli forced herself to meet Borodin's eyes. "There he is!" he pointed at a tiny figure that seemed to stagger as it hurried toward them.

She hurried to the arms locker, then headed out to meet him. Rafe was carrying 'Cilla, and weaving as he ran. The little girl's face was gray and slack. Spittle glistened at the corners of her half-open mouth, and she shivered convulsively.

"Dr. Pryor! We've got casualties!" Borodin was shouting. Pauli glanced behind her. The captain was helping the children, now staggering in one by one, to sit. Lohr bent forward in the long grass and tried to be sick from exhaustion. Borodin patted his shoulders.

"Don't let the kids come any closer," Rafe gasped at Pauli.

She bent forward to see why. 'Cilla's right boot was gone, except for a few shreds of curling leather that clung to her shin. Four deep punctures showed blue on her ankle, and the entire foot looked as if acid had spilled on it.

. . . that time during basic training, in lab . . . Leslie was trying to concoct archaic liquid fuels . . . washed out of flight training on disability pension . . . because you needed two good hands to fly . . .

Had 'Cilla survived the Gamma massacre just to endure this? "Will she lose the foot?"

"Depends." Alicia Pryor knelt beside the unconscious girl. "She's deep in shock; I won't risk sedation. No, Rafe—don't touch her skin! Whatever she got into, if I don't neutralize it fast, it's going to dissolve her foot!"

"I saw . . ."

"First I work on 'Cilla. *Then* you bury everything—starting with the clothes you have on—that may have come in contact with this acid. Then you can tell me what you saw." Rafe tried to protest. "Move it, Lieutenant!"

Pauli drew her gloves on and followed Rafe to the riverbank. Before he knelt, he gazed about, studying the ground with care. Then he collapsed the way Lohr had and retched dryly at the water's edge.

"Steady now," Pauli murmured. "Whatever else happened, you got the kids back alive. And you've given 'Cilla a chance. Lie back now and rest."

Careful not to brush against them, Pauli removed Rafe's outer clothes. Already the acid from 'Cilla's foot had begun to eat through the tough synthetic of his pants and had made inroads into the leather of his jacket. She took off her own jacket and tucked it about him.

Digging a hole in the soft, easily turned mud of the riverbank, she buried the contaminated garments and added her own gloves. Then she marked the spot with a large flat stone. Rafe shivered, and she moved to put herself between him and the wind.

"Let me get you a blanket," she offered. But he grasped her wrist hard.

"Someone's got to listen to me, Pauli, so I'll know I'm not crazy."

"You should report . . ."

"The captain's got all he can handle now. Damn it! Girl, just this once, don't play things by the book . . . *please*." Rafe clasped her hands between his. His fingers were clammy and shook convulsively.

"All right, Rafe. Let's hear it."

"We headed south toward the flats. At noon we stopped to rest. About that

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time, we saw rock formations in the distance. Scan registered them as about five meters high. Curious thing about them, too. They were all oriented along this world's magnetic field. Exploration never mentioned them in the preliminary reports on Cynthia."

"Technological life-form here? You think they're hostiles?"

"I don't know, I don't know." Still clutching at hers, his hands went to his face. Pauli stroked his hair back from his forehead.

" 'Cilla was sure Ro would want pictures, samples of the rocks. Maybe they'd have inscriptions on them. So we headed that way."

He shook his head. " 'Cilla had been frisky all morning. Twice already I'd had to order her not to run ahead of the group. Of course she got away again to get the first close look. I shouted at her to wait up, then headed out after her. She kicked one of the stones, and it cracked. I'd have sworn it was stone, solid.

" 'It's not real rock,' she yelled." Rafe shut his eyes, as if trying to blot out memory along with vision. Pauli leaned forward and brushed her lips against his forehead.

"That was about the time she started screaming. I ordered Lohr and Ayelet back, drew my gun, and motioned the civs to fan out. God, there must've been sixty . . ."

"Sixty what?" Pauli finally succeeded in pushing him down to lie on his back. Then in the next instant, he was up again.

"I don't know what you'd call them. Grubs. Maggots. Segmented, with thick black hairs on each, and splotchy patterns. Each one must have been half a meter long, most of it mandibles. Did you see the marks on 'Cilla's foot? One of the things grabbed her. I don't know if it was the bite or the acid that hurt so badly. Some more grubs were coming at me. I burnt a circle around 'Cilla and me, then blasted the one that was gnawing on her. I'm just afraid I didn't do it soon enough. Then I picked her up and jumped the fire. Once I got clear, we laid down a barrage and sent all those things—and the rocks—up in flame."

He rolled closer to Pauli and buried his head against her shoulder. Before she realized what she was doing, her arms went around him. There was an astounding ache in her throat, a tightening in her chest. *If they had gotten Rafe too. . . !* "You got 'Cilla out, and you warned us, Rafe. You did your job. That's all that's important right now," she told him, and knew that it wasn't quite true. He felt right in her arms, as right as the glider had felt that morning.

Rafe's hands clasped her shoulders tightly, kneading them. "Pauli, but what if that wasn't the only infestation?"

"You've done all you can for now," she told him and pressed his head against her breasts, trying to soothe him. "Rest now. Try not to worry about the grubs. We'll manage. Hell, Rafe, any race that can move itself from caves into starships ought to be able to keep them in check."

A race that fought planet-breaking wars, against grubs that spat acid and attacked children . . . and seemed to be on an interception course with their settlement. They were stranded here; they'd have no choice but to fight. *The civs are*

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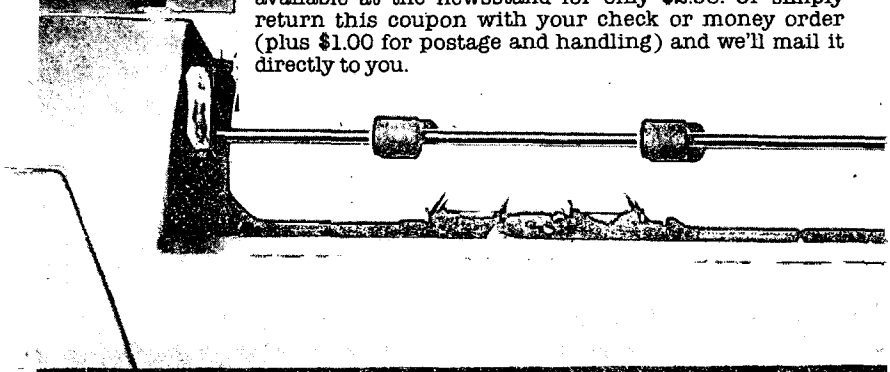

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going to love this! As Rafe dozed in her arms, Pauli sat and contemplated a bleak future until Borodin came to collect them both.

Captain Borodin stood by the fire, hand on his sidearm, waiting. Would the Cynthians show up tonight? He had several hundred questions for Rafe to ask them. And he'd think the Cynthians would have some questions of their own. He had a long while to wait. But as a few of the settlers began to wander away from the fire, Ariel and Uriél spiraled down beside it. Borodin gestured, and Rafe began to create a new symbol on the readout: small, segmented, long-fanged.

The Cynthians mantled, then subsided. Their antennae moved fast. The read-out blurred with their agitation. Then, very gradually, it settled into recognizable symbols.

Rafe turned to the Captain. "Closest equivalent I can get is 'those who eat' . . . eaters." You won't get better than that, sir," he said.

"We ought to blast them all," grumbled David ben Yehuda. He had his arm about his daughter; her twin sat on her other side. Both the father and the son held flame-throwers. Borodin had had all he could do to keep ben Yehuda and his cub from starting out that very night.

"Rafe, ask if these eaters are the Cynthians' enemies," Borodin ordered.

Symbols: *Cynthians / mountain caves: eaters / rocks . . . a Cynthian, wing-crippled / eaters engulfing it / plants devoured . . .*

"The Cynthians flee the eaters, Captain," Rafe said. "Since they like us, they want us to run with them. They're not equipped for fighting them."

"But we are!" Pauli cried.

Borodin watched the junior pilot carefully. Her commission date preceded Adams's and, as Adams had not, she had aspired to ship command. What would she suggest? Then it occurred to him that she was suggesting a fight as one way of removing the strain from the man.

Ariel's wings were drooping, their luminous colors subdued. Borodin felt a moment's sympathy for the Cynthian: older, and presumably stuck with the responsibility for the smaller Cynthians which hadn't shown up tonight. Perhaps they hadn't been permitted to.

"What would you suggest we do, Lieutenant Yeager?" Borodin asked.

As if sensing something electric, Uriel fluttered its antennae, swept palpae back and forth, and beat its wings two or three times.

"I say we push the eaters hard. Given our limited food supply, we can't retreat to the Cynthians' caves. So first, we guard the camp by burning a clear zone on the land side. If there's nothing to eat, the grubs won't try to cross. We'll be planting, so we'll have to set up watches. And every time we see eaters, we burn them out. And—" Borodin realized that Pauli had saved the most controversial element of her defense strategy until last—"I further suggest that we develop a pesticide that'll stop the eaters permanently."

Pauli, I think you just went too far, Borodin commented silently. *Now you're going to have to stand by those words.* The civilians were muttering.

"I don't hold with poisoning alien

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life," Beneatha stated. Since she was a botanist, they'd need her, too.

"How'd you like an eater to latch onto your foot?" Ben Yehuda motioned his son to hush.

For a while, Borodin thought that everyone around the fire was trying to make a speech at once. Finally he held up his hand for silence.

"I didn't want to have to say this. Federal Security, as some of you have probably had your suspicions, didn't assign me here just because my age and reaction time made me a bad combat risk. I don't know if all you people realize that they're counting on us . . . *up there* . . . to be waiting for pickup after the war . . ."

"Assuming they win . . ."

Borodin let that muttered comment pass. *Don't make me declare martial law,* he wished the civilians. Banking on whatever good will he might have built up with the civs, he pressed on rapidly.

"A couple of years from now, if we're not picked up, I don't want to hear noises that maybe the Confederation lost. It could mean . . . well, it could mean that there's nobody in shape to pick us up. So we're going to have to get used to thinking of ourselves as the human race. Perhaps we're all that's left of it. I say we keep it going. None of you look to me like potential suicides. So I think you'd better consider Pauli's plans for defending this place.

"Now, Beneatha's raised a serious issue: destroying alien life. Rafe, would you say that destroying eaters is destroying intelligent beings?"

"God, no!"

"Please ask the Cynthians how long these incursions last."

Symbols formed on the screen which blanked, then lit with the answer. They could expect attacks every two years.

"As far as I'm concerned, that settles it," said Borodin. "If they come every other year, you'd be spending half your lives as refugees, or in constant fear of going out one morning and coming back like 'Cilla, or not at all. Which option do you choose?"

"Your lieutenants were quick enough to adjust the comms to 'speak' to the Cynthians," Beneatha rose, her shoulders forward aggressively. "Why can't they adjust it to transmit off-world so we can leave here?"

"You don't really want to risk the Secessionists' intercepting the message and finding out our coordinates, do you?" Borodin demanded. Was she being deliberately difficult, or were her objections based on arcane civ principles? "Never mind my orders," he went on, hoping to win her over. "I think we have an obligation to protect ourselves and the children. If we can't contain this . . . infestation, well, I don't like it either, but the eaters won't be the first extinct species our race has racked up."

"Maybe the Cynthians could suggest a way of helping out," suggested Pryor. She might be a civ, and an aristocratic one at that, but she had good ideas, Borodin thought.

But the Cynthians mantled when the humans put the question to them. Finally Borodin himself took over the comm from Rafe, who sat with his head buried in his hands, and tried to assure the Cynthians that they didn't have to fear. But the winged creatures grew

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more and more agitated. "They're terrified of the eaters," whispered Pauli.

Finally the comm crackled and squealed. The Cynthians took off, and the comm lights blinked out. Even the screen blanked, except for the small green decimal that floated languidly from left to right on the useless readout. The fire crashed in on itself and the burnt logs crumpled into ash.

"That must have been some speech," Pauli whistled. Borodin was minded to agree with her. "Tomorrow, on my orders and my responsibility, we will organize our defenses," he said. "I don't think we can expect help from the Cynthians on this. So we will see what we can manufacture in the way of pesticides. And another thing: every morning some of us will sortie until the plains round about are clear. Understood?"

"Pryor told me she can save 'Cilla's foot," Pauli was glad to report the next morning.

Borodin nodded, then promptly won an argument by ignoring it. "I'm to be the only one taking along a glider, Pauli. You may be lighter than I, but I've got the experience."

"Are we going to need that glider, sir?" Rafe asked. "What do you plan to launch from?"

"Those, if I have to." The captain pointed at some distant rock spurs. "It's only in case we have to get a message through, and our communicators fail. We'll have a backup. Me."

Pauli grumbled, then subsided. Pilots relied a lot on instinct. And Borodin, as he said, had the experience. She nodded encouragingly at Ari ben Yehuda, who carried a flame-thrower. Then she turned to give her final instructions. "Strip the camp perimeters. Start digging a trench and fill it with brush or anything else flammable. If the eaters come, dump oil into the trench and shoot. We can always approach by the river."

Beneatha looked stubborn.

"Do it," Borodin said. "I can't afford to leave Pauli or Rafe behind to see that orders are carried out."

"Security prepared you for everything, didn't they, Captain," the xenobotanist gibed. "Weapons, which none of us have the keys to get at. Martial law. Secret orders. But they didn't prepare you for these eaters. So now, naturally, you have to kill them."

"Would you prefer it had been 'Cilla?" a man snapped, much to Pauli's relief. Things were getting too polarized: military on one side, civs on the other. "I'll round up the older kids. They can help."

By afternoon, they had reached a section of the plains they had never explored because of the rock spires that Borodin had pointed out from camp. The rocks looked like jaws, Pauli thought.

The small muscles along Rafe's eyelids and jawline twitched. In the bright light his face seemed as remarkable to Pauli as his body had felt the night before. He had clung to her as if her touch, her heartbeat were all that protected him from the eaters or his dreams of them. Today, as Rafe turned to her and smiled, the strain in his face lightened, and Pauli, seeing it, was glad.

Borodin, carrying communication gear, headed for the peaks.

"Look up there!" Pauli shouted.

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Overhead, brilliant motes glinted and danced between the rocks. "I thought you said that the Cynthians were nocturnal, Rafe."

He drank from his trail flask and wiped his mouth on his sleeve, then smeared his hands down his trouser legs before answering. "They're watching us."

"They've been doing it all morning." Ben Yehuda lowered his field lenses, rubbed his back to ease it, then swung his flame-thrower back over his shoulder.

"Captain was right on his idea of a backup after all," Pauli said. "The Cynthians can generate enough interference to make comm transmission impossible."

She activated her own lenses. They whirled almost sickeningly, seeking rapid resolution and filtering against the sunlight. Distance grids and markers snapped into place.

"Rocks at four hundred meters," she said. "Rafe, do they look anything like the formations you saw before?"

Overhead, Borodin shook his pack from his back, He flung his arms wide and shook his head to indicate that the comms weren't working.

"The rocks . . . looks like the eaters have already broken free," muttered Rafe. His lenses fell from his hand and slapped against his chest. Then he looked up. Swooping at them with a breathtaking, precipitous urgency that delighted Pauli even now were five Cynthians. Two of them were the larger, more somber elders.

Pauli gazed at them, a horrible idea forming in her mind. "Did the eaters break free," she asked, "or were they hatched?"

Rafe stopped to stare at her, aghast. "Hatched," he repeated. "Hatched. And I didn't want to think of that, either. Enough happened right away that I didn't have to. Hatched. You do know what you've just implied, don't you?"

"The Cynthians aren't watching us," Pauli said slowly. "They're guarding them. The eaters . . . that's who they're protecting." She felt like vomiting. No, the eaters weren't sapient . . . not at this stage of their life-cycle. They were merely hatchlings, voracious, driven by their survival instinct to devour everything within range until the weather cooled and they encapsulated themselves once more, to emerge in the spring as . . .

No wonder the Cynthians fled questions about the eaters. No wonder they wouldn't help find a solution that would block the eaters' movement from pasture to pasture. Even if that meant their new friends' lives—for what were they, against the life of their own species?

Fire lanced down to char the nearby brush.

"Get moving!" Distance thinned Borodin's voice. He waved his free arm frantically, then fired again into the bushes. "Eaters!"

There they were, heaving across the plain between the rock teeth. The ground was mottled and roiling with them. Pauli started to tremble. She imagined that she could already hear the gnawing of the eaters' huge mandibles and the hiss of acid. Rafe stood at her shoulder. If he had survived this, she could too.

"Get them all!" shouted the captain. "I'll fly the news back."

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She wanted to scream at him to wait, to tell him that the eaters and the Cynthians were different stages of the same race, but he was waiting for an updraft, he had found it. . . . Pauli drew her weapon and waited for the eaters to come within easy firing range. No use wasting charges. Her hand shook. How strange that she hadn't expected revulsion to slow her down. Would it have done so if she flew a fighter? She was damned if she'd allow this.

"Do as much damage as you can, then retreat," she heard Rafe instruct the ben Yehudas and the other civilians on the flame-thrower crews. "If you're cut off, head either for the rocks or the river."

She was *not* going to freeze. She waved at Borodin, the signal of a mechanic to a pilot ready for launch. He grinned and signalled back, then stepped off the bluff and into flight.

And, circling high above, the Cynthians folded their great, luminous wings and plummeted down to block him.

"Don't engage them!" Pauli shrieked. "Get back, Captain!"

Of course they'd try to stop him. The eaters were revolting, but they were the Cynthians' offspring.

"What's wrong?" Rafe cried. He was methodically burning off the first eaters to crawl within firing range.

Rafe, not being a pilot, couldn't read the conformation of the Cynthians' flight pattern the way Pauli could. It meant deterrence. Failing that, it meant attack.

Borodin, seeing the menace in those diving bodies, veered in a wide circle out over the plain where the eaters swarmed. Fiercely Pauli willed his glider to maintain altitude. It swayed in the cross-winds, and she felt the vibrations in her arms as if she, and not Borodin, were the one flying.

"For God's sake keep firing!" Rafe shouted. The eaters were ominously close. They were hideous things, but except for those jaws and the acid, they were easy to kill. Just like the beautiful sensitive creatures that circled overhead, trying to protect their ghastly offspring long enough for them to fatten themselves on the moist lowland grasses and enter dormancy, to emerge as winged Cynthians.

Borodin banked sharply. Now he seemed to head back to the camp along his initial route. The Cynthians dived at him again. This time they came even closer. They slashed at the glider with their forearms. Again the captain swerved. He lost altitude almost disastrously. Only a fortunate gust allowed him to recover.

Now ben Yehuda and his son marched past Pauli. The muzzles of their flamethrowers wheezed and whistled blue flame. Three Cynthians dived at them. Ari bolted, then returned to retrieve his weapon.

One of the larger Cynthians saw Borodin making his escape. It launched itself at the captain and dragged its foreclaws on the metal fabric of the glider. Sparks ripped from the cloth. Then the Cynthian somersaulted backwards, righted itself, and attacked again.

Borodin was only human, Pauli thought. He couldn't fight and fly a glider simultaneously. But compared with a Cynthian, what was a human pilot but the crudest interloper in the skies? The captain gained altitude, then

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counterattacked by diving on the Cynthians.

Pauli raised her gun for a long shot.

"No!" One of the civilians hurled himself against her arm and the energy bolt went wildly astray. "That's an intelligent being!"

"So is the captain!" Pauli shouted. "And he's ours! What do you call *these* things? We have to kill eaters. Does it really matter at what stage of their lifecycle we kill them?"

Pauli flamed down three eaters, then backed away to watch the captain. The civilian still shadowed her, so she was afraid to draw. A bad shot might hit Borodin. The Cynthian he had dived at evaded him, then flew back to try again. Borodin dodged it, so intent now on this one adversary that he didn't notice how the others had climbed high overhead. One launched itself into a power dive. At the last possible instant, it jerked its head sideways and brushed the captain's arm with its poison horns.

Borodin screamed in surprise and agony. With his arm paralyzed by the venom, he couldn't keep the glider level. Like the Cynthian earlier, he went into a somersault, head over flailing arms and legs, tumbling out of the sky with the now-useless glider to slam into the rock spurs. As the struts of the glider twanged and snapped, broken man and broken craft fell to the plain where the eaters swarmed.

"I hope he died before he hit ground," Pauli whispered.

"Oh Gods, I didn't mean it," muttered the man who had spoiled her aim. Pauli could not look at him. If she looked at him, she might kill him, and she needed him alive to kill eaters. She began to shoot, and was glad to crisp eaters until the stink of their execution became intolerable. Rafe and ben Yehuda retreated, but Pauli kept on shooting. There had to be something left of Borodin for her to recover—his service tags, a belt buckle, the broken struts of the glider. Pauli would kill all the eaters, then go after it.

People were running past her, coughing and retching from the stink. "Get back, Pauli!" Rafe screamed. He ran to her, had her by the arm, and was forcing her away from the dead place. "You can't do anything for him now."

Overhead, the Cynthians flew back to the safety of their mountain caves, which their hungry, mindless children could not reach.

"Can we build up the fire?" Pauli muttered that night. "Eaters are afraid of fire."

"It's warm enough, Pauli," said Alicia Pryor firmly.

Rafe reached out and gripped Pauli's shoulder. Before the physician could, he tucked the foil blanket about her.

Then the truth hit him. With the Captain zeroed out, command fell to Pauli. Sure, she was younger than he, but commission dates were what counted in chain of command: hers preceded his. Besides that, she was on command track; he was on research. Granted, Rafe would do anything to save her pain, but at this moment he was devoutly grateful that their positions weren't reversed.

At least we got together again before this *happened,* he thought. Pauli might otherwise have retreated away from him into her new rank. But now what? Convince the Cynthians to set boundaries

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to children they feared and couldn't control? But even if they could control the eaters' movements, would they? They were fliers, and fliers recognized no boundaries.

"What worries me now," said Pryor, "is the next wave of eaters. We can retreat into the perimeter defenses . . ."

"They didn't know they would kill him, Rafe," Pauli whispered. "They were only trying to warn him off. They didn't know how limited his maneuverability or that he'd put up a fight. And they were protecting their young."

"As we must?"

"What else can you expect, man?" asked ben Yehuda. "Do we just sit here, depleting our resources, every year a little more? You call that living? What sort of life would we make for the children? Look: I'm not going to tell them no, you can't go out because there are things crawling around there that will eat you up, like a bad fairy tale."

"That's not the point!" shouted Beneatha. "If the eaters and the Cynthians are truly part of the same race . . ."

"Why doesn't she just come out and say it?" Pauli murmured. "The word's 'genocide.' "

Someone heard her and repeated the word. Like a curse it hissed from mouth to mouth.

"That's what they call it when you eliminate an intelligent race," Rafe said. "The only problem is that in our situation, doing anything else is suicide. Very possibly, racial suicide. All right! My friends, you may be willing to accept death for yourselves, but will you let your children die, too?"

"What about *you?*" Beneatha asked ben Yehuda brutally. Black face and weathered one locked eyes. Neither looked away.

"Genocide," he murmured, and shook his head in sorrow. "Perhaps you're right . . ."

Ayelet looked up at her father and interrupted. "You used to tell me the stories from before the Terra blockade. The camps. A thing called the final solution. When we escaped . . . I thought that that must have been something like it. Do you remember the story you told me about one place the Terrans called Masada? All its defenders killed themselves. Very heroic, you said . . . but very dead. Weren't you the one who told me, 'Masada must not fall again'?"

"I don't want to die," her brother Ari added. "Not if we can think or fight our way out of it."

Pauli looked about for someone to take the lead, someone who could exploit the change in mood that the twins had brought about. Then she remembered: she had to be the leader now. Rafe gave her a tiny, encouraging shove, and she rose and stood before the fire.

"I haven't got Captain Borodin's experience, and you know it," she began. "But I guess I've inherited his responsibilities. With your help—if you'll give it to me—I'll be able to do what he'd have wanted, I think: build us and the children a safe place to live." She aimed those last words straight at Rafe. *Don't leave me. I can't manage this alone.* His smile warmed her.

"The problem's been stated and restated. We can retreat and employ time-buying strategies. This will just drag out our own defeat; you all know we're going to have to farm here if we're to have enough food. Or we can suicide

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straight off. Ayelet and Ari have just given their reactions to that." Pauli squared her shoulders. Her new authority felt like a lead cape settling down on her for life.

"You all know I didn't want to be stranded here. But now that I'm here, I'm damned if I want to die. I don't think I'm alone in that, either. But even if I were, there are still the children to consider. They're not voting members of this group yet. But as you know, they haven't had much of a life so far. That was the point in coming here, wasn't it?—to give them good lives."

But at the price of eliminating the Cynthians?

"I think all of us ought to reconsider," Dr. Pryor spoke up. "Lieutenant . . . no, *Captain* Yeager . . ."

Pauli shook her head, rejecting the promotion she had once longed for.

"She's the one who had the guts to bring up the word we were all avoiding so carefully. Genocide. It's an ugly word. But keep in mind that before we knew what the eaters were, we were all set to wipe them out. *That* wasn't genocide; it was pest control. You might also keep in mind the fact that we've seen the Cynthians to be scared and revolted by the eaters. But they still protected them. Can we do less for our own children?"

"We've got another problem," Rafe said. "I hate to bring it up, especially now. But it isn't just the eaters we have to deal with. Even if we do eradicate this generation, it's only one generation of eaters. The full-grown Cynthians will simply breed more."

"I don't want to kill Cynthians," Pauli said softly. She scrubbed at her

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eyes. Spots flamed, bright as the whorls and stars on a Cynthian's wings. If they made the world safe for the children, there would be no more Cynthians to exult in the cross-currents or the high passes.

"Can't you all think of anything else?" Beneatha's voice was husky and stripped of its usual belligerence. She sat with her arm about Lohr. The boy was still groggy from the sedative Pryor had had to give him when he refused to believe that the captain wouldn't suddenly fly back home. He had tried to run off and look for him.

"There is something else to think about," Pauli said. "The Security marshal told us that we were being planted here as a sort of genetic . . . seed corn, in case the rest of the race became gene-damaged or sterile in this war. Rafe, is there some way to make sure that this generation of Cynthians is the last? I don't want to kill them, but . . ."

"Interfere with their breeding capability?" Rafe gnawed at his lower lip. "There's got to be a way. Say we gave them something that they liked. No," he was muttering to himself now, "They'd detect the taste of an additive in a sweet syrup . . ."

Pauli glanced out over the listening settlers. She was glad that Rafe was backing her with his popularity and his expertise.

He shut his eyes, dizzied by trying to come up with a solution fast. A nagging feeling at the back of his brain told him he was on the track of something. But he was so damned tired! They were all worn out. *Pauli, call this meeting off!* They all needed sleep.

Now the fire had burned down. Smoke coiled from the embers, sweet-smelling, overwhelming the scent of the river, the plants, and the remembrance of the stink of charred eaters. He'd never be free of that smell. Smells . . . the Cynthians were incredibly sensitive to smells. And mating season was near, when they would breed a new generation of eaters, attracted to one another by . . . madness . . . brought on by pheromones.

"I've got it," he said quickly. "It's near mating season. And we know that smell is a powerful stimulus to the Cynthians during mating. Like those colors on their wings. What if we gave them something that enhanced those colors, made them shine like landing markers while eliminating their capacity to reproduce, or at least to produce viable eggs."

One way to do that might be some form of radiation. He could imagine the objections to that and, as they came up, realized that even left unspoken, the threat of radioactives would make his next suggestion more acceptable.

"All right," he said. "All right! No radioactives. I don't think I'd know how to develop or apply them, in any case. So what's left? Our trap will have to be chemical . . . organically based."

Rafe would need time, Pauli thought, and ended the meeting. Both of them were too worn out for anything but sleep. But Pauli dreamed of old Terra: the story of the aristocrat who sold contaminated blankets to natives, and the island where the natives died off within a generation of their having been discovered by "civilization". . . .

"All I ever wanted was to fly," Pauli whispered. "How will they remember me, Rafe? As a genocide?"

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"Was flying all you ever really wanted?" He drew her closer, coaxing her to rest. He could foresee that in the years to come this would be one of his roles: to calm her and comfort her as she struggled with a burden she didn't want. Seeing as he didn't want it and wasn't in line to be stuck with it, this seemed the least he could do. The very least.

Pauli rubbed her cheek against his shoulder. "Not quite all I wanted," she murmured sleepily.

"Rafe . . . Pauli . . . Captain?"

For one moment, as she woke, Pauli had the mad hope that Borodin was back. Why else would anyone be calling for the captain? Then she remembered and suppressed a groan.

"Don't call me that. Am I late for the meeting, Dr. Pryor?"

"It'll begin when you get there. You have time to eat yet. But I wanted to tell you that you haven't got a thing to worry about. Just leave it to me."

Heartened by the physician's words, Pauli ate hastily, dressed, and — accompanied by Rafe—walked outside to call the meeting to order.

Pryor rose immediately and asked to be recognized.

"David, last night you recoiled at the thought of killing the Cynthians even in their eater stage because you thought it was genocide. Now let me ask you a question. If you knew for certain—for absolutely certain—that we were all that was left, would you still feel that way?"

"Ayelet said it for me last night. She changed my mind for me. We have to stay alive."

"I think," said Pryor, "that this is the question Pauli's wanted us to ask ourselves all along. But she's been too tired, to say the least, to force the issue. Certainly we like the Cynthians. And they like us. But they'll fight to go on living, to protect their children, however horrible they are. That's the issue: anything else isn't relevant."

"I can't give you orders on this issue," Pauli said. "I wouldn't try to, in any case. Let's put it to a vote." Perhaps Borodin wouldn't have done that. There was room for only one captain on board a ship. But this wasn't a ship, she wasn't a captain, and she certainly wasn't Serge Borodin. She wouldn't be shirking her duties by making sure they shouldered their own.

Rafe set to work. The communicators and the microcomp had preserved not only the Cynthians' sign-system but also their pattern of antenna-activity. From them, Rafe discovered just what chemicals caused Cynthians to enter mating readiness and respond to one another. The pheromones were multi-component—long-chain, unsaturated acetates, alcohols, aldehydes, with a few hydrocarbons tacked on. Sweet. Rafe tested them first in solution, then sprayed them into the air to test them that way. Atmospheric contact might make them test out differently.

Ironic, he thought, that these smells that signal *here is life!* to the Cynthians would bring about the death of the entire species.

On some planets, people baited the creatures they wanted dead by poisoning low-value foliage. When he brought up that idea in council, he was shouted down.

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"Not here you don't!" Beneatha insisted. "You don't know what its effects—if any—will be on the ecology as a whole, let alone on us. Long-term, as well as short-term. And we're going to be here for quite a long term, I'd say." She spoke and looked as if she hated that idea. Pauli, who had been trying to win Beneatha as an ally, hastened to agree with her.

So the pesticide would have to be applied directly. How?

"Make up some scent that the Cynthians would like," Lohr suggested, "and then make them trade for it."

Rafe wanted to slap the boy. It was indecent to profit from the death of the species. But he had a point. Still, even if they followed his advice, how could Rafe be sure that the pheromones he had synthesized were the right ones? He wouldn't have much time to test them. If he missed this mating season, the eaters produced could doom the tiny colony.

For the last time before she started up the rock chimney, Pauli wiped her hands on her legs. She only hoped Rafe was right when he claimed that this was the way to the Cynthians' hibernacula. It was ironic that those were the caves into which they had so wanted the humans to evacuate.

Well, this was as good an approach to the caves as any. If Rafe was right, the Cynthians couldn't make it through this passage. But if he were wrong, then one of the smaller ones, the nymphae, might well swoop down into the chimney to touch them with its poison horns and send them screaming to the bottom of the shaft. But there would be no eaters, as there had been for Borodin, to finish them off. They could lie there broken for hours.

So Pauli could not let Rafe climb up into the mountains alone. Someone would have to cover his back as he stole into the Cynthians' caves. She was small enough and fast enough to do it. What was more, she was a pilot. If she had to, she could fly back to the settlement on the glider she had packed into the hills.

"Look," Rafe whispered. "There they are."

High in the air the Cynthians were dancing, a mating dance of such beauty that Pauli wondered for a traitorous instant if this trip were really necessary. Then she remembered Borodin falling and clenched her teeth. To the end of her life, she'd hear that last scream of his and the sound he'd made as he hit ground and rock.

"I'm going in," Rafe whispered. "Cover me." Not three meters away, the rock hollowed out. Rafe disappeared within the cave. Pauli drew her weapon and prepared to wait. If Rafe couldn't find the clue he needed, she would have to give the order she despised and feared: the synthesis and use of pesticides so powerful that they might poison their own thriving crops if they applied them to anything but the Cynthians themselves—and they'd have no other option. It would be terrible if they were destroyed by their own weapons, wouldn't it? Or would it be a weird sort of justice? It wasn't a question she cared to debate, even within herself.

Now the Cynthians were diving, turning incredible loops, and pairing off. Pauli felt not just like a voyeur, but like

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a voyeur preparing to turn murderous. Then she shook her head. The lives they fought to safeguard wouldn't be worth living if they used them only to wallow in guilt. And it wasn't fair to the children. They were innocent of this decision and would have to be brought up as free of their elders' guilt as could be managed.

Rafe emerged, a wide grin on his face. Pauli wrinkled her nose at his smell. "You smell like Cynthians, only more so." She wanted to sneeze. The fragments of powder-like wing scales that clung to him had an odor that was musty, yet aromatic.

"You knew, didn't you, that Cynthians' scales and wings shed. What you didn't count on was the fact that they're excited now, which is why this stuff smells so high. I can do my bioassay now, with this material. And if I can't get my synthetics to test out, I'll simply grind up this stuff and return for more. Now, come on. It's getting on toward dusk, and we'll need light for the climb back down."

Lohr had been right all along, Pauli thought weeks later. The Cynthians would have to be tricked into acquiring the poisons. After Borodin's death, they would have suspected a gift. But seeing 'Cilla (whose foot was healing about as well as anyone dared expect) painting by the firelight, the Cynthians had pricked up their antennae at the paints she used—brilliant, full of metallic flecks, utterly enticing both in color and in scent. And when they learned that gifts of fruit, leaves, or glittering rocks would enable them to own that paint, they were taken in.

Now even old Ariel and Uriel gleamed with new potency. They cavorted in the air above the settlement with the abandon of nymphae in their first mating season. When they flew back to their caves at dawn, the sunlight striking their refurbished wings, they were dazzling. Even 'Cilla clapped her hands in delight, and she had been making plans for a mural. Somehow Pauli would have to deflect that particular hope. She had also warned Lohr not to tell her about the relationship between Cynthians and eaters.

As summer advanced, fewer and fewer eaters crossed the charred lines which now marked out human territory on Cynthia. Search parties accounted for some. The watches set over the fields accounted for the rest. Scouts began to report the appearance of structures that resembled those of a year earlier. The Cynthians were preparing to lay their eggs.

"Come next year," said Pauli, "they'll crack. And we'll have more eaters than we know what to do with. And the ones that survive will hibernate to emerge as nymphae and breed even more eaters. So tomorrow, fire parties go out to attend to those hatcheries. But," she warned her staff, "*no more Borodins*. You go armed, and one of you has to watch the sky for Cynthians constantly. If you're attacked, aim to kill."

Later scout parties found little need to protect themselves from the Cynthians. Certainly, they trailed the humans, but their flight patterns were labored, as if they were too weak for much exertion. They could be dodged or run

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from; this was what, with a dreadful pity, the scouts did.

Still, the Cynthians would meet them at night by the central fire. The firelight allowed Pauli to observe how brittle their wings were now. Their body scales were dull and falling off in patches. Some of these patches were stippled by the lovely deadly paint. They were still using it to adorn themselves.

But now, many of the Cynthians who flew down to the settlement to trade for paint never made it back into the mountains. Their wings broke, and their desiccated bodies fell where humans could find them. Beneatha and ben Yehuda appointed themselves a sort of dawn patrol; each day they buried such bodies before the children could happen on them. Beneatha reported that the bodies smelled like dust or dying leaves, rotting after long rains.

"I hope they never guess," Pauli told Rafe.

"That's wishful thinking, love," he answered. "They're bound to, if they haven't already. But the effects of the pesticide are cumulative and irreversible. Even if they stopped using the paint tonight, the damage it's done has gone too far to be set right." His voice was gentle, and completely inexorable.

But his words made each evening at the fire even harder. The winged creatures still appeared, bringing more and more "trade goods" for the glistening paint they seemed to think might restore their strength. That was the only reason Pauli could come up with for their continuing interest and craving. Their dusty, morbid smell filled the air in the evenings and clung to the garments of the humans closest to them.

* * *

The weather was turning much cooler. Since the cold snap started, Ariel had not appeared. But the evening they expected frost for the first time, Ariel showed up, leading a band of nymphae. When it saw the paintpots, however, it swooped down and overturned them with deft flicks of its winghooks. Then it stood, wings outstretched, before the avid nymphae as if it would protect them from the dirtied pools of sweet-smelling, lethal paints.

Several nymphae dodged the elder to dip wing-tips into the poison. Ariel went into threat-display and everted its poisoned horns. But the nymphae ignored it. Ariel mantled then, antennae quivering in agitation. With a sweep of great wings, the elder flew above the fire, brightness falling from its scales into the fire. But it avoided colliding with the nymphae, reluctant, even at the last, to harm them. Ariel climbed higher, banked, folded its wings, and dived into the fire's heart.

'Cilla screamed and burst into tears. In all the painful time of her convalescence, she had never wept so bitterly. Pauli hugged the girl and motioned for people to take away the rest of the children. Now the fire smelled like eaters. It made her ill. Ordinarily, these days, she was only ill in the mornings. And that was another reason to have taken the action they had.

Uriel appeared and flew down toward them. It too looked tired and worn. But the only signal on the comm screen was a simple interrogative.

Why are you doing this to us?

"It deserves to know. Tell it," Pauli

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ordered. She raised her face from 'Cilla's bright hair.

Rafe keyed the screen to transmit one symbol: a human child. Pauli remembered how the Cynthians had panicked at their first sight of a child. Seeing how revolting their own were, that had been a completely natural action.

"Look at that," said Dr. Pryor.

The screen blanked, filled with a host of eaters, then blanked again.

"I think Ariel has put it all together," Rafe said quietly.

Was there a symbol for "sorry"? Even if there were, what good was it? What possible apology could be made for ending a race?

Uriel raised its head. Pauli thought it stared straight at her with those dulled, faceted eyes. Its wings quivered, and it strained upward. Then, in a little eddy of luminous dust from its crumpled wings, it toppled.

The skies were quite clear after that. Pauli supposed that she'd get used to not seeing Cynthians aloft after a few years. She was still gazing into the skies, the way she had when all she wanted was to be a pilot. She had had to: the children had begun to adopt her mannerism—developed after the last Cynthian fell from the skies—of looking shamefacedly away from the heavens she felt as if she'd betrayed.

I didn't have the Cynthians destroyed so the children would grow up to be penitent cowards. I may be a genocide. Maybe I can't bring them up innocent. But they're victims, too.

The guilt she felt was her punishment and that of the other adults. Now *they* were the Cynthians, and Cynthians fought to live and protected their young. Pauli had better gifts for the children than guilt. So gradually, she forced herself to speak to them of flying. After all, she said in these conversations, the stars were a part of their heritage. That wouldn't change, she vowed, whether the ships came for them in the next hour, the next year . . . or never.

If my child's a boy, I'll name him Serge, Pauli thought. *Rafe would be pleased. If she's a girl, 'Cilla will have a namesake and someone to tend.*

After all, she was a Cynthian now, and no Cynthian child must ever grow up into a heritage of shame. Cynthians protected their own. ■

● In a direct confrontation with superior creatures from another world, the reins would be torn from our hands and we would, as a tearful old medicine man said to me, find ourselves "without dreams," that is, we would find our intellectual and spiritual aspirations so outmoded as to leave us completely paralyzed.

Carl Jung

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HOLLYWOOD

July 28, 1982

Although I've been reading and writing science fiction for years, I've tended to avoid *movies* labeled science fiction unless they came highly recommended by people whose judgment I respected. I've been stung too often by movies whose inane dialogue and implausible situations made them little more than caricatures of *real* science fiction. Even the better ones have usually (though not quite always) seemed to regard lavish special effects as a substitute for intelligent writing and acting, as if it were necessary to choose one or the other.

This past summer we have seen an unprecedented number of new science fiction movies released about which I can say, with some pleasure, "That's pretty good—for a movie."

But why must I always add that hedging qualifier?

I haven't yet seen *all* of this year's crop, but I have seen several of the most talked about—and I have to admit that there are commendable things about them, both individually and collectively. As a group, they cover a span of content and attitudes well beyond the usual cinematic stereotypes. We have futures as downbeat as the Los Angeles of *Blade Runner* and as upbeat as the universe of the *Enterprise* in *Star Trek II*; we have aliens as relentlessly nightmarish as *The Thing* and as cute and cuddly as *E.T.* Such variety, even though it's a pretty small sampling, may give the general public at least a hint of just how broad the scope of science fiction really is. Individually, each of these movies does very well at least one thing which has not often been done before—but each is also flawed.

The Thing is, superficially, much closer to the original story (John W. Campbell's "Who Goes There?", published here in 1938) than the earlier version of the movie. But I doubt that John would have liked it. It lacks subtlety—it relies on well-nigh continuous, explicit gore to convey the horror which could have been more effective if understated. The quiet doubt about "Who goes there?", properly exploited (as in the story), can be far more chilling than a screen constantly writhing with tentacles and innards. And the alleged "research station" seemed to have no

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occupants who acted at all believably like scientists or technicians. Not only did they fail to solve their problem in the end, but they behaved so stupidly from start to finish that I couldn't take them seriously.

E.T. is a refreshingly sympathetic alien, and his story was a lot of fun—provided I didn't think too hard about it. If I thought about it, I would become too conscious of the simplistic nature of the plot and most of the characters. The human children are pretty believable, but E.T. himself seems more like a very bright teddy bear than a professional botanist, while the adult human medical and scientific personnel are stupid mechanical monsters bearing little resemblance to any I've known in reality.

Blade Runner, perhaps more than any other movie in my memory, creates the *feel* of a real, multi-dimensional time and place. (Not one I'd want to spend much time in, but that's a matter of personal taste.) Ironically, at least one review complained that, "The texture is too rich." But the problem is not that the setting is too rich, but that the characters (lacking the nuances of Philip Dick's printed page) are not rich enough to complement it. The result is something like a play with exquisitely detailed, full-color, realistic stage settings, but performed by black-and-white cardboard puppets.

Star Trek makes a commendable effort to work within a plausible, multi-dimensional background, and *Star Trek II* lets some of its characters be a little more human than ever before. But some of its science must be taken with a rather coarse grade of salt, and surely the plot, hinging on a Madman bent on Revenge, has been done to death and could make room for something else.

So—none of these films is quite The One I've Been Waiting For. But I take some encouragement from the fact that each of them does *something* better than I'm used to seeing it done. It lets me hope that maybe it won't be too many more years before somebody makes one about which I can say, "It's *good!*"—without adding, "For a movie." All I ask is a movie which does *all* these things right at once: a movie which is as much fun as one of Spielberg's, with a setting as rich as *Blade Runner*'s, with believable and sympathetic characters both human and alien, with freshness of plot and subtlety of telling, and scientific background for which no apologies or special allowances must be made.

What I'm hoping for, in other words, is a single movie which meets *all* the criteria we expect of an outstanding *written* story, and in addition exploits the special capabilities of film. Until now, it seems, no one has believed that such a thing could be done with commercial success. I offer the heretical suggestion that it's worth a try. Maybe Hollywood has been underestimating its audiences. I may be wrong—but only by trying it will we actually know. And if I'm right, then we can embark on a new age of science fiction movies a good notch above even the best of the past.

There are people out there who have demonstrated the skill and are in a financial position to take the risk. Who will have the courage—to try a science fiction movie which appeals on *all* levels to an audience which is not only big, but reasonably bright?

— Stanley Schmidt

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Joseph Goodavage

ASTROMETEOROLOGY

Even the author, I think, would admit that this is not yet a science. But might it be a better engineering tool than those in common use? Judge for yourself; for starters, there's a prediction in here, made in December 1981, which you can check...

On a warm Saturday morning in late August 1947 George McCormack drove his pre-war Oldsmobile to the local post office in Fair Lawn, New Jersey, and dropped off two bundles of letters —actually mimeographed copies of the same letter. Then he drove confidently home to await the results.

Four months later the old man and his wife sat by their small Christmas tree in the parlor and listened to the weather forecast on the radio. The reports were for clear to cloudy skies, no precipitation, and slightly higher temperatures. Really lousy for Christmas weather, especially in view of the fact that McComack's 35 years of intensive study and practice had prompted him to predict "a really white Christmas." In fact, he had predicted a blizzard that would bury the New York area and the entire northeastern part of the country under two feet of snow. McCormack had a drink with his wife, chinked out his cigar, and followed her to bed.

New York City awoke paralyzed beneath a blanket of 26 inches of snow. Then George McCormack's phone started ringing. It rang every winter thereafter for the next dozen years. *How did he do it? Why hadn't the United States Weather Bureau or any other meteorologists been able to predict "the blizzard of '47" mere hours before it hit?*

McCormack repeatedly explained that he'd done the same thing scores of times, and that his forecast was based on solar activity on a seasonal basis, correlating the planets as they formed multiples of fifteen degrees of celestial longitude, with the Moon as the "timing" factor.

That was all quite interesting, but the newsmen who beat a path to his door weren't intrigued by such facts as Neptune on the nadir at 150° of celestial longitude or the declination of Jupiter in quadrature to Saturn as the latter crossed the celestial equator. What was going to happen next, and where?

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The astrometeorologist devoted most of the decade painstakingly calculating seasonal anomalies, fully expecting scientific recognition each time the long-range forecasts were vindicated. All he got was a scrapbook of headlines indicating his prowess and a few low-paying contracts to provide weather predictions for amusement parks and a lot of travel agencies and utility companies.

McCormack was objective, dispassionate, and excruciatingly humble, never tried to promote himself, and always referred to himself in the plural sense, which satisfied his idea of Victorian propriety and scientific objectivity. He was an electrical engineer.

A few of McCormack's predecessors were less self-effacing. Captain Alfred J. Cooper, in his book *Solectrics: Explaining the Cosmic Causes of Seismic and Volcanic Disturbances and Other Natural Phenomena,* said: "Knowing that I have successfully commanded ships for twenty-nine years, seamen will feel what is here set down may be trusted; for the ocean is no place for fools."

Being an excellent navigator, Captain Cooper noticed in charts set up for August 10 and 11, 1915 that the meridian for Naples indicated a quadrature (90°) between Mars and Jupiter would occur at the time of a solar eclipse with Mercury conjunction the eclipse. Weeks in advance he reasoned: "Vesuvius, Etna and Stromboli are situated on the same meridian within one degree, so that when a strong force in a north and south direction strikes that meridian, they are liable to blaze in sympathy."

He avoided the area and warned that a hurricane would coincide to the westward at Martinique on August 10, 12h. 21m. Greenwich Mean Time.

On August 10, 10 h., 52 m. G.M.T., Vesuvius, Etna, and Stromboli experienced a dozen earth shocks and erupted in unison. Within an hour and thirty minutes Martinique was slammed by a violent hurricane. "My diagram worked out for about nine minutes earlier than the actual events," Cooper explained later.

Two examples from hundreds of similar predictions and reports demand an explanation. The problem is that modern seismologists are as helpless as meteorologists. Earthquake experts give various guesstimates on when the next devastating quake will strike California—sometime during the next century—or fifty years—or ten. The intensity should be high on the Richter scale, but there is never a forecast on its magnitude.

Is there a common relationship between seismic and atmospheric phenomena? More important, is there a connection between sunspots and weather? In spite of a year-long intensive study of the oceans and atmosphere by a 147-nation effort called Global Atmospheric Research Project (GARP) in 1977, no connection was established. Still, the edicts of weather experts vary widely. One group declared that it had shown rather conclusively that sunspots had nothing to do with terrestrial weather; that's the present stance of the U.S. Weather Service. Donald L. Gilman, chief of the predictions branch of the USWS's Climate Analysis Center in

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Washington, declared, "We don't take solar variations into consideration in the service's long-range forecasts. We make our predictions by comparing wind velocity and air pressure at 10,000 feet."

No astrometeorologist, however long or impressively accurate his track record, has ever been able to surmount this dogma. If the official articles of faith decree that solar activity has nothing to do with terrestrial weather, there's no reasonable way to convince meteorologists that the planets are *also* involved or that the Moon plays an important role in *timing* anomalies of weather.

When he was head of the National Center for Atmospheric Research at the High Altitude Observatory in Boulder, Dr. Walter Orr Roberts decided that sunspots did indeed affect weather, and that there was an unknown connection between solar activity and the interplanetary magnetic field. This came close to bridging the gap between cosmic forces and terrestrial phenomena, including changes in the Earth's spin, earthquakes, and even volcanic eruptions. The real-universe evidence shows that our solar system is indeed an interdependent, interactive element in the cosmos.

Astrometeorologists are less concerned with theory than practice. They don't know *why* it works, but *that* it works.

When John W. Campbell was editor of *Analog*, we showed him a file of news clippings attesting to the abilities of George McCormack's astrometeorological practice in forecasting weather disasters seasons—even years—ahead of time. Campbell read McCormack's unpublished paper, "The Theory and Practice of Astronomic Weather Forecasting." Clasping his hands behind his neck, he leaned back in his chair and regarded us with an impish smile, his hooded eyes amused. Campbell then removed the cigarette and its long holder from his mouth and dropped both meaty hands on his desk. "All right, I think you can do it. Put up or shut up." There was no malice in his challenge.

Campbell created a new feature called *Crucial Experiment* that ran in *Analog* from October 1962 through August 1963. It was divided into two columns—the astro-weather forecast and a purely random, spin-of-the-wheel forecast.

Here's a sample taken from *Crucial Experiment III* for December 1962:

ASTRO FORECAST "On Dec. 25th-26th, a low pressure area growing from the northern Pacific Coast will drift eastward and focus over the northern central states on December 27th and 28th. *Bitterly* cold temperatures, skidding downslope and eastward, will become even more intense *east* of Chicago . . . this will set the pattern for a *Saturnine* winter."

RANDOM FORECAST "Beginning on December 22nd and centering over Pittsburgh, Pennsylvania, a mild, warm spell will prevail, spreading northward until it reaches the Canadian border states on December 31st." (For this, we used three wheels. Each was spoked with 30 lines, like a thinly sliced pizza with an arrow in the center; one was for weather, one for timing and another for geographical

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location. We had some wildly improbable random forecasts such as blizzards in Miami on the Fourth of July and mid-January heat waves with temperatures in the 90° - 100° range in the Rockies, Montana, and Wyoming.)

ACTUAL WEATHER (Actual Weather Report on *C.E. III* appeared in the May 1963 issue of *Analog*. All reports were taken solely from the Weekly Weather and Crop Bulletin published by the Weather Bureau's Statistical Reporting Service. "Brass Tacks" letters from readers in the affected areas provided more detailed corroboration.) "Preceding from the North Pacific coast across the Great Plains, snow fell almost daily in the Great Lakes area. The entire northeast section of the nation was buffeted by gale winds, heavy snowfall and sub-zero temperatures."

In the interest of fairness and objectivity (as well as space limitation), I chose at random from one of the briefest astro-forecasts. It was by no means one of the brilliant bulls-eye hits or off-center misses of the series. *Analog*'s readers, many of whom followed Crucial Experiment with their usual insight and intelligence, noticed that the Random Forecast was almost 20% more accurate than the United States Weather Bureau's 90-day outlook. Moreover, the Astro Forecasts were judged to be above 90% accurate, which brings up an interesting point:

Back in 1945, when RCA Global Communications was seeking a method of making shortwave radio transmissions that would not be interrupted by "poor radio weather," RCA executives appointed John H. Nelson, a radio ham and amateur astronomer, to find some way of predicting storms in the ionosphere, that layer of rarefied gas enveloping the Earth 200 miles high. This "ceiling," from which radio waves are "bounced" around the curvature of the Earth, is created by solar radiation, particularly in the ultraviolet range. Magnetic storms on the sun (sunspots and solar flares) rip up the highest reaches of our atmosphere; these result in ionospheric storms that garble and even destroy radio transmissions. (Satellites have alleviated some of this problem, but it still exists.)

For some reason even he can't explain, Nelson imagined himself in space looking down upon the solar system with the planets revolving at various distances around the Sun. He found that sunspots were somehow associated with the angular relationship between the planets, and that in any situation in which planets formed any multiple of 15 degrees, the quality of radio propagation would be affected, provided *one* of the angles is 60 degrees (sextile), 90 degrees (quadrature), 120 degrees (trine), or 180 degrees (opposition). The rule was invariable.

In really important disturbances, at least two fast-moving planets and one or more slow-moving planets must be involved in the configuration.

Until his recent retirement, Nelson's accuracy rating was 93.2%, almost identical to that of George McCormack, whose system is virtually identical. Something is happening in space that connects and affects all the planets and

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the Sun. What that "something" is, nobody knows, and—alas—meteorologists generally refuse to consider. This "sin of omission" is, I believe, clearly reflected by the extremely poor quality of their short-range forecasts (the U.S. Weather Service has long since abandoned its attempts at 90-day outlooks).

With the help of then-Senators Robert Kennedy and Jacob Javits, who became interested in the reports on *Crucial Experiment* I'd sent them, a little political arm-twisting resulted in a special seminar for the formal presentation of McCormack's Theory and Practice of Astronomic Weather Forecasting. Although Nelson's work with RCA had been widely publicized and his own papers published by the New York Academy of Sciences and presented to the American Meteorological Society and the AAAS, his appearance in support of McCormack's work was greeted with something less than scientific objectivity by the weather bureaucracy.

The subsequent changes in attitude toward the concept of astrometeorology is slightly promising, perhaps because a new generation has grown up in the space age. But there is still no interest among meteorologists to think in astronomic terms. The bias is even stronger in reverse.

This is unfortunate because the theoretical model of the mechanisms (which were unknown to early astrometeorologists such as Johannes Kepler, Isaac Newton, and several of those amazing Greeks of classic antiquity), involving harmonic refinements in the electromagnetic stability of the solar system discovered by John H. Nelson of RCA and reported in his book *Cosmic Patterns*, suggests an extraordinary congress of energies—the interplanetary magnetic field, the solar wind, the system's ever-shifting center of gravity and the role of the Moon as the "key" or final arbiter in pinpointing future weather anomalies for specific periods and locations.

To present-day scientists, it is still a quantum jump to the inconceivable notion that other planets play various roles in producing or influencing terrestrial weather. It's hard enough to propose a method in which sunspots can be shown to have a connection to weather, but two scientists at the National Oceanic and Atmospheric Administration have pinned down not just a statistical match, but a mechanism that links the solar cycle and the activity of the Earth's atmosphere.

George C. Reid and Kenneth S. Gage studied the dynamics of the atmosphere over the tropics, where warm air rises through the bottom of the atmosphere until it reaches the stratosphere. The boundary is called the tropopause. The rotation of the Earth gives air at the equator greater velocity than at more northern or southern latitudes.

This tropical air then mixes with cooler air from 30 to 40 degrees north and south latitudes and generates a powerful eastward flow called the subtropical jet stream. Both the United States and large parts of South America and Australia—to the north and south—lie within its range. Whenever there's a variation of energy in the jet stream, it may shift location.

According to George Reid and Ken-

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neth Gage, this happened during the winter of 1980 (beginning at the winter solstice, Dec. 21) when the jetstream was yanked far northward as far as Canada before dropping back to the mid-latitudes. This, they believe, dragged down the frigid polar air, bringing on "a record-breaking cold winter in the eastern part of the United States."

The scientists reason that, if the amount of energy in the jetstream can plunge Boston and Buffalo into a deep freeze, the energy level of the stream must be affected by changes occuring in the sun, especially during its somewhat controversial eleven-year sunspot cycle. (Among others, Hurd Willet, professor emeritus of meteorology at MIT, proposed a connection between this cycle and Jupiter's gravitational pull on the sun during its eleven-year revolution. Because there have been unexplained anomalies, times when the sunspot cycle went "off the boil," the action of other gas giants—Saturn, Uranus, and Neptune—was studied. Astronomer Charles G. Abbot, director of the Smithsonian's astrophysical laboratory from 1896 until 1944, and Andrew E. Douglass, director of tree-ring research at the University of Arizona, perceived and studied, in Dr. Douglass's words, "the astronomical forces at work—the motion and positions of the planets and behavior of the Sun which are responsible for the kind of weather we have. The combination of sunspot cycle occurrences and planetary movements holds the key to the forecast of weather conditions over an extended period of time.")

Solar radiation heats the tropical oceans and raises atmospheric temperature. More moisture clings to warmer air, and as it rises the water condenses. The result: still more energy release. The tropical oceans are a huge waterbath that responds even to small changes in solar radiation. The slightest changes in temperature at sea surface are greatly enhanced at the tropopause, and this level varies, according to twenty-two years of records gathered from tropical weather stations, with the solar cycle.

The more sunspots, the higher the tropopause. As the solar cycle peaks, the sun ejects flares and "boils off" greater amounts of ultraviolet and x-ray wavelengths. More and more solar energy pours into the atmosphere, warming the sea and heating the air, which inflates the troposphere, which rises and causes a shift in the jetstream—and the Mississippi Valley is deluged. Governors ask the president to declare their states disaster areas.

Interesting, but small potatoes compared to the potential of the vastly more powerful and intricate forces unleashed within the bailiwick of the solar system. No doubt there are extra-solar energies at play, but at this point astrometeorologists avoid such speculation as assiduously as meteorologists recoil from serious consideration of the planets and Sun acting in the interplanetary magnetic field to influence weather on Earth.

Long-range forecasts are crucial to the future of modern agriculture. By the time this sees the light of print, you will know whether or not the repeated warnings of a weather disaster beginning with the winter (solstice) of 1981 —

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published in various articles and *Our Threatened Planet* (Pocket Books)—for most of the United States, particularly the midwest and New England areas, will have been accurate. My neck is well out on this one; United Press distributed the story and forecast in 1978, and later in the year the Associated Press carried the story and it was picked up by scores of newspapers across the country. You can't go very deeply into the reasons for such a forecast with reporters, but anyone who correlates weather, solar activity, and the angular positions of the planets eventually perceives some of the more intricate connections.

For example, as a result of a series of forming and separating aspects between the planets, the Sun, and each other, you might reasonably expect a high incidence of solar activity on December 10-16, 1981. This would have a long-lasting effect on terrestrial weather and, due to a long list of complex configurations including northern and southern declinations of planets (parallel and contraparallel of declination) at least two great earthquakes and a preview of the devastating weather should manifest in the United States.

Through one of those strange "coincidences" writers, scientists, inventors (and all of us, I suppose) experience during periods of intense concentration, John Nelson called me on his 78th birthday. After the personal amenities (we'd become friends in 1959), he said, "Get a photograph of the Sun today."

"Increased sunspots," I ventured.

"Increased? Listen, boy, in all my forty years of observation I've never seen anything like it. It looks like it's been blasted by a cosmic shotgun! Your forecast is working very well indeed. I think you're absolutely right about this winter."

(Nelson had checked McCormack's work against his own and knew that "radio weather" in the ionosphere is almost identically impressed on the troposphere, the weather at the Earth's surface.)

In addition to the seasonal forecast derived from studying a celestial map for the moment of the cardinal ingresses when the Sun is at 00° 00′ of the celestial equator (the vernal and autumnal equinoxes) and at its most Northern and Southern declinations (the summer and winter solstices), astrometeorologists watch for eclipses, major conjunctions, and oppositions, important parallels of declination, and lunar phases that precede or immediately follow the solar ingresses.

On December 10, 1981, Jupiter formed the sextile aspect with Uranus, both almost conjunct at 0° and 1° north declination. The Sun and Mercury were at 257° celestial longitude. All the planets were in southern declination, i.e. *south* of the celestial equator, except for Mars (which was at 2° N latitude, as was Saturn). The Earth-Moon system was alone as all other planets "bunched" together on the other side of the Sun. The next day, December 11, there was a full moon. A large-magnitude earthquake occurred in the San Francisco area. This was, in my estimation, the first of several that will strike the west coast of the United States, Japan, and several other

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as yet uncalculated areas by the time this is published.

It takes about four days for the effects of solar convulsions to reach the Earth, sometimes longer. This "lag" is a fly in the ointment for astrometeorologists and quite difficult to explain except by analogy, which I will attempt later in this article. The element of uncertainty, however, dogs all the sciences. In *Supernature* Lyall Watson observed, "Science no longer holds any absolute truths. Even the discipline of physics, whose laws once went unchallenged, has had to submit to the indignity of the Uncertainty Principle. In this climate of disbelief, we have begun to doubt even fundamental propositions, and the old distinction between natural and supernatural has become meaningless."

The time lag between a cosmic event and a terrestrial reaction can't be simply explained in purely mechanistic terms.

Certain problems simply don't have an easy cause-effect relationship. Take gout, for example. Medics had a hell of a time trying to unravel the tremendously complex correlation between a patient's diet and his painful attacks of gout. It was "generally known" that a rich diet could result in an attack—*but not always*. (That's why it was called "the rich man's disease").

Sometimes a patient could eat a very rich diet and suffer no reaction at all. Over a long period of dietary experiments with many patients, a gout-free diet was evolved. Still, nobody could explain why certain gout-prone people could eat rich gravies and sauces *without* getting the characteristic pain in the toe or foot.

Then some biochemists discovered a certain tolerance level to the *purine* molecule (found in gravies, sauces, anchovies, lentils, and turkey, but not—for instance—in beef, chicken, beans, or salmon). If the patient happened to overdo his intake of the purine molecule in foods like this, he knew it pretty damned quick! Yet he *could* eat things containing the purine molecule and avoid the reaction—*as long as his particular tolerance level wasn't breached.*

Picture a sink with both a running faucet and an open drain. If the input is greater than the outflow the water will reach the top and overflow—the spillover being analogous to the gout attack. Nature is replete with such correlations of time-lapse between cause and effect.

Astrometeorology holds that planetary conjunctions and eclipses of the Sun and Moon set up some kind of force fields in space which *remain dormant until triggered or released by planetary transits in angular distance to the eclipse point or other sensitive points.*

Impressive correlations exist between cycles of weather, earthquakes, and volcanic eruptions. These curious but unexplained relationships have been recognized for several centuries. Recently economic analyst Edward R. Dewey became director of the Foundation for the Study of Cycles, and immediately perceived how natural phenomena on Earth seemed in almost perfect synchronicity with extraterrestrial cycles. To most scientists, it was interesting but inconclusive because few had ever made a serious attempt to probe

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further into an intriguing and promising new field.

Several combinations of seemingly unrelated cosmic factors can create the right conditions for an earthquake, but only when the solar system's center of gravity (thus the interplanetary magnetic field, the solar wind, and possibly a synergistic congress of energies whose effects are generally unrecognized) is disturbed. The most superficial study of these forces quickly reveals awesome potence, efficiency, and inevitability. To someone untrained in physics, the concepts are almost too shattering to contemplate. (I happen to be untrained in physics.)

Meteorologists could benefit enormously by checking past weather disasters against what was happening among the planets and on the Sun prior to and during the disasters. It soon becomes clear that terrestrial weather is somehow connected to changes in the solar system's center of gravity, among other forces. It is an area unexplored by modern science, and something that must eventually be reckoned with.

We know from Soviet and American lunar seismograph studies that the position of the Earth plays an important role in the production of Moonquakes. Logically it should also work the other way around, and with astrometeorology, it does. As science editor of the New York *Herald Tribune* in the 1950s, John J. O'Neill won the Pulitzer Prize for his work spanning three years of earthquake predictions, all of which were published in the *Herald Tribune*.

"The Sun and Moon," O'Neill wrote, "exert maximum forces when they are on a line with the Earth at New and Full Moon, which takes place alternately at fourteen-day intervals. The Sierra region is more sensitive to the New Moon combination, and the San Andreas and other *parallel* fault regions respond to the Full Moon situation.

"As the Sun starts changing its altitude in the solstices on June 21 and December 21, new strains activate the full length of the great mountain ranges. This strain, plus the maximum forces of the Sun and Moon combined, at the New or Full Moon which follows, provides the most likely breaking point for the release of an earthquake." This gravitational change is intensified when an eclipse or major planetary conjunction or opposition occurs at the time of the solar ingress.

Aristotle wrote the first known treatise on weather; it was his *Astrometeorologica*. With the crudest of astronomical instruments, a gnomon, Anaximander of ancient Greece was able to predict the date that the city of Lacedamia would be destroyed by an earthquake. In the 17th century Johannes Kepler achieved his initial fame as an astrometeorologist who predicted, a year or more in advance, the dates of the bitterest cold spells in Steyermark, Germany.

The list of scientific minds which studied and practiced astrometeorology also includes Archimedes (who discovered the law of specific gravity), Galileo (astronomer and the father of physics), Isaac Newton, John Flamsteed (the first Astronomer Royal, founder of the Greenwich Observatory), John Herschel (astronomer, discoverer of Uranus),

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Charles Greely Abbot (head of the Smithsonian Institution for over forty years), Andrew E. Douglass (originator of the science of dendrochronology at the University of Arizona), Irving P. Krick (former president of the American Meteorological Association), and a long list of lesser-known men.

What makes an astrometeorological forecast? First of all, in addition to having a working knowledge of the solar system, the astrometeorologist has the advantage of millennia of observation and testing of the theory that each planet has a different kind of influence. Venus, for example, generally conduces to higher temperature and precipitation, while Saturn is associated with low barometric pressure, and acts most negatively under the aspects of conjunction (0°), opposition (180°), the parallel of declination, 30°, 45°, and 135°. When Saturn is stationary, it is conducive to rising warm and moist air masses with air flows whirling *counterclockwise* from all directions toward the center.

Next to the Moon, Mercury is the fastest-moving planet relative to the Earth and forms more configurations with other celestial bodies than any of the others. Mercury is connected with wind direction and velocity. In aspect with Venus, the winds are gentle and southerly, with rising temperatures southward. Mercury with Saturn results in lower barometer, prevalent easterly winds, increasing humidity, and varying degrees of cloudiness which may range to overcast skies.

Uranus has a sidereal period of 84 years and crosses the Earth's equator every 42 years. Its cycles of change occur every seven years with respect to terrestrial weather, and it has a mean daily motion of 42.23 seconds. The Sun's conjunction with Uranus occurs about 4½ days later each year. Uranus is related to the *highest* barometeric pressure and activates *descending* cold air not only from the Arctic, but also from those rivers of intensely frigid air in the high reaches of the atmosphere —the subtropical jetstream.

When the astro-weatherman calculates all the known elements, you can see by the brief glimpse given in the preceding three paragraphs that thousands of calculations and judgments are necessary to produce a reliable forecast. The chief value of astrometeorology is the relative ease of perceiving severe future *anomalies*, instead of forecasting insignificant changes in temperature and precipitation. Using this system, we were able, for example, to predict (in print) Hurricane Carol sixty days before it wrought death and destruction on the east coast from Florida to Maine.

In the words of Cicero: *Sufficit si quid fiat intelligamus, etsi quomodo fiat nesciamus.* ("It is enough if we understand what is done, although we are ignorant *how* it is done.")

The celestial charts for the equinoxes and solstices are basic tools: before he ventures any prognoses, the astro-weatherman must have the charts for the beginnings of the respective seasons for the *location* of required observation. Here, in brief, is how he proceeds:

He may then transpose the celestial map for any place on Earth. The more technical approach is to set up similar charts and transpose them for three time

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meridians westward, i.e., for each fifteen degrees west of the nearest time meridian. These are the primary keys to interpretation.

The *meridian* represents the local magnetic field. Planets in the radix at the nadir or transiting that point impress their natures on areas northward in the northern hemisphere. At any chosen point of observation, planets on or near the midheaven are important arbiters for southern regions.

All subsequent lunar phases are referred back to the solar ingress charts. This includes eclipses, particularly when they occur on or near the meridian or in any multiple of fifteen-degrees of planets. It becomes quite complex, yet it doesn't require much more than a year of applying the formulae of astrometeorology to perceive the great beauty and precision with which terrestrial events follow cosmic happenings within our solar system.

During the winter months of 1954, G.J. McCormack busied himself with charts for the vernal equinox of 1955, transposing this celestial map to various meridians on the American continent. What he saw prompted him to mail a dire forecast to friends and colleagues that a polar air mass would descend through Montana and spread throughout Texas and six southern states beginning with the new moon of March 23, 1955.

The lunation or new moon chart for that date (at 21:42 hrs. for 90° west longitude) revealed that Venus would be at 318° on the lower meridian, with Saturn in quadrature of the meridian at 93° west longitude. Venus was approaching to within 2° of opposition to Pluto. Considering the natures of the planets, the winter's conjunction of Jupiter and Uranus, both "retrograde" as seen from Earth, and Venus and Saturn both 14° south in declination, McCormack rechecked and was satisfied that he was right.

On March 25, 1955, a mass of polar blanketed Montana and spread south into Texas. At Bozeman, Montana, the temperature dropped to 32 degrees below zero. On March 26 the worst spring blizzard in years lashed the Rockies. The deep freeze intensified in Texas on the 27th, with sub-zero temperatures in Fort Worth. Then the cold wave spread throughout the south and destroyed $50 million-worth of peach crops in seven states.

The blizzard that struck New England on the weekend of December 5 and 6, 1981 cost the city of Boston $30,000 an hour. The Commissioner of Public Works estimated that he had spent $386,000 of the $320,000 allotted to him for snow removal for the entire winter. (The difference of $66,000 came from snow removal money left over from the previous year.)

At this writing, it is clear to any astrometeorologist that the worst is yet to come for the northeastern United States, the Midwest, and the west coast for the winter of '81. Irving P. Krick was working on the forecast for the winter of 1985 in 1957, and Dr. Hurd Willet, who studied the effects of planets on the Sun and weather at MIT for 40 years, believes we're in for the five worst winters of the century.

Since astrometeorology has repeatedly proven a valuable tool in very long

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range forecasting, you can't help but wonder what it will take for meteorology to take stock of its track record and admit that perhaps there IS a method that *could* have predicted the catastrophes that will have occurred during the winter of '81. ■

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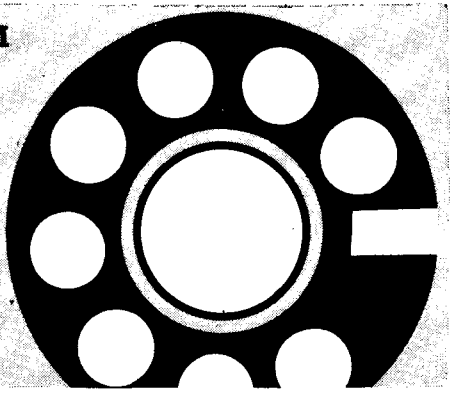

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The Alternate View

Function vs. Form

G. Harry Stine

Engineers use a phrase that's rarely heard in other circles: "The state of the art." Scientists use the phrase only when discussing hardware—the instruments or experimental equipment that permits them to test their hypotheses against the real universe. Artists, on the other hand, usually are unaware of the phrase; art is art, and always has been.

Perhaps these are generalities, but they have spawned some enormous technical monstrosities, the blame for which usually has landed upon the shoulders of the engineers, not the artists who insisted that form is primary and that function must be subservient to beauty.

Beauty may be in the eye of the beholder, but aesthetics are determined by whoever holds the upper hand—i.e., the artist, architect, chief engineer, marketing manager, comptroller, or chief executive officer. If the engineer isn't head honcho, he becomes the poor chap who must use a technological shoehorn to make the final result a reality.

Scientists are interested in form only as it relates to the function of the universe, operating according to their hypothetical concepts. Form follows function.

Engineers operate under this philosophy as well. "A gasoline motor must not have tassels or ornaments," says Harry Domin, CEO of Rossum's Universal Robots in Act I of Karel Čapek's classical 1923 stage play, "R.U.R."

Although an engineer is aware that his "art" is based upon much the same sort of empirical know-how and personal preference as the artist's, he also knows that the bridge will fall down if form doesn't follow function.

In spite of this, the human race continues in this technological age to suffer the inevitable consequences of the artistic approach: "Form is beauty and must remain predominant."

As a result, there are automobiles that look like space ships, have no decent aerodynamic qualities, and are pure horrors to mechanics who must maintain and repair them. Automotive engineers are given external shapes and internal designs with orders to squeeze everything in . . . and mind you don't spend too much time and money doing it, either, because the stylists have already spent too much money and taken too much time, and we can't afford to miss the prescheduled introduction date.

There was a Chevrolet Manza produced in the 1970s from which it was necessary to remove the engine if you needed to change the spark plugs. One of the current crop of transverse-engine, front-wheel-drive passenger cars requires special tools to replace the alternator, although the alternator was mounted with ordinary tools prior to the assembly of the engine to the chassis. The Ford Motor Company has long been

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known for making cars that require special repair tools (available only from Ford). I once owned a 1952 Studebaker whose radiator was tipped backwards by a significant number of degrees in order to achieve a low hood line. If you have the intestinal fortitude to peer under the hood of nearly any modern car, you will have to admire the engineers who somehow managed to cram all that stuff under the hood in order to comply with the dictates of the styling department.

Trucks are usually somewhat different. Here, form usually follows function because none of the artists in the styling department really wanted the assignment of designing the new truck model. My International TravelAll is a joy to work on because it's put together with screws and nuts rather than hidden sheet metal clips, and I can use ordinary tools on most of it.

Buildings, dwellings, and other structures in which human beings live, work, and play comprise another area where it's likely that the artist predominates over the engineer. (I have nothing against good architects, mind you; I just wish there were more of them. Nor do I have any beef against artists, especially those who don't try to bend the universe to match their fantasies.) Back in the 1860s, Eugene Viollet-le-Duc wrote, "We, who in the fabrication of our machinery give to every part the strength and the form which it requires with nothing superfluous, nothing which does not have a necessary function, in our architecture foolishly accumulate forms and features taken from all sides, the results of contradictory principles, and call this art . . ."

Many people continue to believe that Greek temples represent a standard for ultimate purity of architectural design. However, if you apply even the most elementary structural analysis, you'll discover that Greek post-and-lintel structure requires materials with considerable tensile strength. To build such structures, the Greeks originally used wood. When they substituted stone, the stone pillars could handle the compression loads but had to be moved closer together to overcome the lack of tensile strength in the stone lintels. The Greek temple is an example of a bastardized design that is a technological dead-end.

It's possible to overcome the deficiencies of the Greek temple design by hidden internal steel structure. An engineer will gladly do this; it makes his task easier, will produce a sturdier building, and will not harm the external aesthetics.

But many artists claim that such hidden structure is "dishonest" or even "immoral!". And don't you believe that such artists aren't still with us and occasionally put in charge! Beautiful buildings have been and are still designed on the artist's principle that there are "pure" forms such as cones, cubes, cylinders, and pyramids. And a design that was developed for one type of material may be built with a different material, with the result that the old design no longer works.

The architect for the Kresge Auditorium at MIT wanted a "perfect form," a dome of constant thickness supported by three massive foundations. When the supporting construction forms were removed, the large bending forces of the shape required expensive after-the-fact

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internal steel reinforcement of the dome, redesign of the window mullions, and the addition of a lead roof to prevent leaks. The latter only added to the weight that had to be supported, and the resulting additional deformation of the dome hastened the deterioration of the lead covering so that the building was flooded and the internal steel reinforcement corroded with every heavy rain.

In Sydney, Australia, they've got another "form is everything" mess on their hands: a beautiful opera house with sail-like roof shells of concrete raised on a terraced platform. The design was selected in an international competition on the basis of the architect's *freehand sketches*. The architect then demanded that the arching, pointed shells should be "honestly self-supporting." The design, determined primarily from visual aesthetics, was required to withstand the forces of wind and gravity without any "dishonest" hidden structural support. Millions of dollars were spent to design an intricate prestressed concrete roof; then more millions to redesign the terraced foundation which, in its original form, wouldn't support the complex shells. They chased aesthetics and ended up nine years behind schedule and 1300% over budget, all in the name of "honest design."

Then there's the Oakland water tank. The architects were weary of commonplace cylindrical tanks, so they designed a multi-faceted reinforced concrete tank with "honest" self-sustaining walls. They should have concealed a cylindrical tank inside because, after 400,000 gallons of water were pumped in, the jointed walls failed because of hoop forces and flooded the adjacent residential area.

Yes, this sort of thing provides engineers with work—if they can survive the resulting ulcers.

These are examples of major goofs in the "form versus function" battle between engineers and artists. We're surrounded by little examples of it all the time. Is your furniture comfortable or pretty? Can you sit in your car for six hours straight? Does your roof leak?

Many people will object that a world built on the engineering principle of form following function would be a sterile one reminiscent of the glass-box skyscrapers of most modern U.S. cities or the art deco of the 1930s. But that's an argument over "style." Many structures that have been designed by engineers are now recognized as things of beauty. Have you ever seen *le Tour Eiffel*? Christopher Wren's St. Paul's Cathedral? The Small Sports Palace built for the 1960 Olympics in Rome? The Dulles International Airport terminal? The National Air and Space Museum of the Smithsonian Institution?

Beauty may be in the eye of the beholder, but can we afford it at the expense of the universe?

Engineering can survive without art and its aesthetics, but can art survive without engineering? ■

● Don't ever take a fence down until you know the reason it was put up.

G.K. Chesterton

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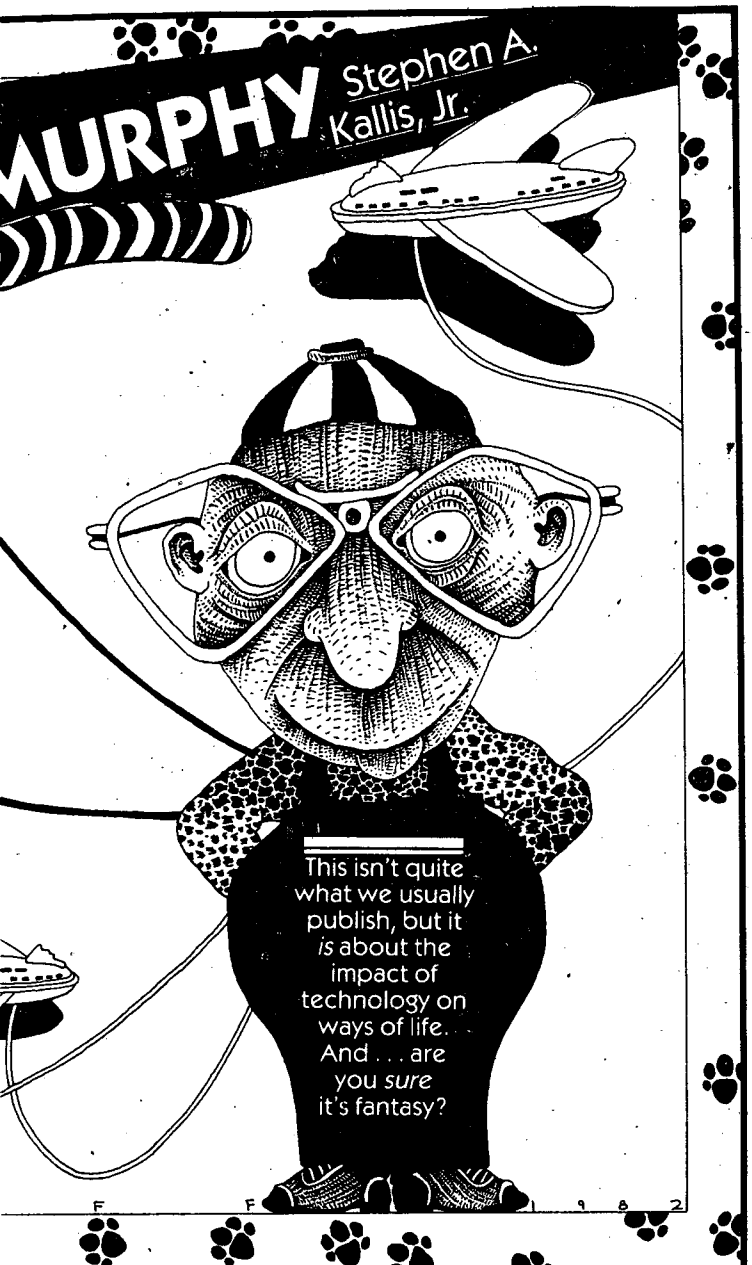
MURPHY
Stephen A. Kallis, Jr.
This isn't quite what we usually publish, but it *is* about the impact of technology on ways of life. And . . . are you *sure* it's fantasy?
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Lawrence C. Hamilton glanced uneasily out the window of the noisy and vibrating airplane and wondered whether hitching a ride had been such a good idea after all. The airplane had seemed so big and solid on the ground, and the pilot had had the appearance of one of those stalwart types he saw in the movies. But somehow it was quite different when he was all the way up here.

He remembered when he had told his friend, John Theiry, that he had never been up in an airplane. Theiry had been scandalized. "Good Lord, Larry," he had said, "This is 1948! *Everybody* should experience the thrill of flight." And Theiry went on to say that he had an acquaintance who owned a small flying service composed of a couple of planes he had picked up war surplus, and who could be persuaded to let Hamilton ride along as a guest for a flight to a country airport.

"Good place for you to take that camping vacation," said Theiry, as if that settled it.

Somehow, it did. Hamilton had to admit that airplanes looked rather majestic as they moved across the sky, and that the whole thing seemed like a grand adventure. In his whole life, he had never experienced a real adventure, grand or otherwise. He rather wondered what he might be missing.

The pilot seemed to add to the feeling of adventure. He didn't wear a uniform like his airline brethren, but the grizzled and leathery specimen seemed to carry himself in a special way that made him look as if he set foot on the ground only out of necessity. Even his name, Alex King, seemed to fit.

Of course, the pilot had a different perspective on everything. King said, "You'll ride in the cockpit with me," in a rumbling voice as he picked up most of Hamilton's roped-together camping gear with one hand and deposited it casually in the cargo section. Hamilton followed him up to the cockpit.

As King had him strap into the right seat, Hamilton was dazzled by the many dials that stretched in front of him. The strange-looking levers and the placards saying "No Hand Hold" emphasized that he was not sitting in any kind of car, even though there was something resembling a steering wheel in front of him. He considered King's cautionary instruction not to touch any of the controls quite superfluous; he didn't want to have anything to do with them.

When the engines kicked over and settled into a shuddering roar, Hamilton became fully aware that he was not in a car or bus. When they started to take off, the additional noise and the vibration made it quite certain.

The takeoff reminded Hamilton of a carnival ride, though because of the climb he could see only blue sky with a few fleecy clouds dotted here and there.

After takeoff the airplane lurched about a bit in what the pilot told him was light turbulence, but which seemed rather scary to Hamilton. However, when they got a little above a scattered layer of clouds, things seemed to settle down, including Hamilton's stomach.

He looked and decided that the sky looked the same from a height as it did from the ground. Besides, he had heard that, when somebody was climbing a tall ladder, it was best not to look down,

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and he thought the same rules might apply when riding in airplanes.

In due time he did look down, and was slightly puzzled about how slowly the ground crept beneath the airplane. He had always assumed that as seen from an airplane traveling well over a hundred miles an hour, the countryside would zip by, but it didn't. The apparent slow progress didn't make him feel any better about flying.

Hamilton asked how high up they were, and King pointed at an instrument that looked rather like a clock. "Six thousand, five hundred feet," he said. Hamilton reflected that more than a mile of thin air separated him from the ground, and was not comforted.

Things progressed routinely for a while, and he was just beginning to relax the intense grip he had on his arm rest, when one of the engines began to cough and knock.

"Damn," said King, quite unnecessarily. He reached over to an arrangement in front of what Hamilton thought of as the dashboard—although the pilot had called it an instrument panel—and adjusted one of the several levers that stuck out from it like hatpins in a voodoo doll. The engine's noises reverted to normal, although to Hamilton they were still an assault on the eardrums.

"What happened?" he asked.

"Gremlins buggered the mixture," said the pilot.

"Is that bad?"

King shook his head. "Ship like this always has a gremlin or two," he said philosophically. "Just means I'll use up a bit more fuel, more than likely."

Hamilton had heard some reference to "gremlins" before and knew that they were somehow related to flying, but he wasn't certain precisely how.

"Excuse me, but just what are gremlins?"

The pilot smiled. "They're some sort of little people, I'm told. Stow away on airplanes. They like to do mischief, people say. Sometimes they mess up instruments, other times they fool with the engines or landing gear. Strange folk." King got a dreamy look in his eyes as he regarded his passenger. "There were a lot of 'em around during the war."

As the pilot turned to look out the windshield again, Hamilton said, "Oh," and wondered whether pilots were quite sane.

King seemed to keep busy, but he took time to point out things to Hamilton, including several landmarks. However, he would often have to break off to do something mysterious with one or another of the levers, switches, and wheels that seemed to surround him.

By the time King told him that they were starting to descend, Hamilton was maintaining a neutral attitude about the subject of air travel. The vibration and noise were not all that pleasant, but the view seemed pretty good, as long as one looked well out from the airplane.

The pilot had warned him that they'd "hit a few bumps" on the way down, so a repeat of the turbulence didn't come as a complete surprise. Hamilton still didn't like it, though he kept telling himself that the pilot knew what he was doing.

The landing was so gentle that Hamilton wasn't quite sure when the wheels touched the ground. As King guided the airplane toward the hangar area, Hamilton felt a little like Magellan must have

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after circumnavigating the globe. Fortunately for his peace of mind, Hamilton had forgotten that Magellan died in the attempt.

The pilot went through the ritual of shutting down the aircraft, which involved pulling or pushing certain levers and switches in a complex sequence while checking his actions against a printed list and making notes on a separate form. Then he helped Hamilton unstrap, disengage himself, and climb out of the cockpit.

After he was safely on the ground with his gear by his side, Hamilton shook King's hand and said, "Thanks for the ride. It was a good flight." Since he'd never been on any flight before, he had no basis for comparison, but he judged that any flight that he survived would have to be considered good.

"Glad to have had you aboard," King said. Then he excused himself and headed for a small building whose sign proclaimed "Operations."

Suddenly Hamilton was quite alone, standing by the silvery airplane. He remembered that movies with airport scenes showed all sorts of bustling activity, but that didn't seem to be the case here. This airport seemed almost deserted. No redcaps, or whatever they called them at airports, to help him with his camping gear. He would have to make do himself. He wished he had King's casual strength.

As Hamilton bent to pick up his camping gear, he caught a movement out of the corner of his eye. At the tail of the airplane he spotted what at first glance was a small child, clambering down to the ground. But a closer look made him change his mind.

It was not a child. It was a bit too small, and it seemed perfectly formed, more like an adult. "Hey, wait!" Hamilton yelled, and started toward it.

The small form scuttled away from the airplane and dashed to a small supply shed near the edge of the field. Hamilton followed more slowly.

As he approached the shed, he saw the whatever-it-was duck around a corner. Then it stopped and peered around the edge with one eye.

Hamilton approached warily, thinking that maybe someone's pet monkey had gotten loose. "It's all right, boy," he said soothingly. "Nobody's going to hurt you."

He was close to the shed by this time. He knew he wasn't imagining it when he heard a high-pitched voice say, "Hurt me? You're not even supposed to *see* me."

Hamilton stopped. He was accustomed to speaking gently to animals, but he'd never had one talk back to him before. He took a deep breath and exhaled slowly.

"It's all right," he said, unsure of what would be appropriate under the rather mysterious circumstances.

"That's what *you* say," responded the high-pitched voice.

Feeling a little foolish at carrying on a conversation with the corner of a tool shed, Hamilton said, "If it's not all right, what's wrong?"

"You saw me. Humans aren't supposed to be able to do that."

Startled, Hamilton wondered whether the flight had been a greater strain than he imagined. "Humans," indeed. Either he was suffering from a very active fig-

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ment of his imagination or he was treading in some very deep waters.

"So I saw you," he said carefully. "Then why are you hiding? Come out so I can see all of you."

The voice fell silent for a few seconds. Then it asked, "Why should I?"

If Hamilton felt foolish talking to the corner of a tool shed, he felt doubly so arguing with one. "So you can confront somebody who isn't 'supposed' to see you," he snapped.

"Say," said the voice. "I've got you irritated. That's all right."

"Why?"

"It's . . . sort of my job," said the other.

"Then maybe showing yourself will make me more irritated," said Hamilton cannily.

The other said, "I'm getting confused."

Hamilton said nothing.

The other said, "Maybe there's a reason you saw me. It's worth the risk." And Hamilton saw a figure step from behind the corner.

Hamilton had been glad he hadn't been drinking, or he'd have sworn off the stuff then and there. He saw a small creature, vaguely human in shape, dressed in miniature mechanics' work clothes. It had thin but sinewy arms, an oval face with large black-irised eyes, a proportionally small mouth, and tiny, roundish ears.

"Wha . . . what are you?"

The small being shook his head. "That's a fine greeting. You don't get irritated; just tongue-tied."

Hamilton shook his head. The thing looked too *alive* to be some elaborate hoax. "You didn't answer my question," he said slowly.

"That pilot identified what I am. A gremlin. I . . . inhabit airplanes.

"But we're invisible to pilots and crews. How come *you* saw me?"

Hamilton shook his head again, as if trying to clear it of cobwebs. The gremlin was still there. "I don't know. I don't even know why I'm talking to something I've heard is mythical."

The gremlin stared at Hamilton. "You know, you're beginning to interest me. I thought for a moment you were one of those sorcerers that still can be found if you know where to look for them, but you sure don't act like one. You act like you don't believe in magic."

Hamilton decided it would be hard to deny the existence of magic while carrying on a dialogue with a gremlin. He said, "Well, I saw a newsreel about Houdini once . . ."

"*Huh!* I'm not talking about stage magicians. I mean real magic." The little being took a step closer to Hamilton. "You mean you've no formal training in the Art?"

Hamilton said, "I'm not sure what you're talking about."

"No. I guess not," said the gremlin. "Say! Do you know what day of the week you were born?"

Hamilton thought the question was a little strange, but then, so was the situation. "I believe I was told . . . let's see . . . it was on a Saturday."

The gremlin nodded. "That might explain it. Many humans born on Saturday seem to have great psychic sight." He paused for a second. "Have you ever seen any ghosts?"

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"No," said Hamilton. "In fact, I can hardly believe I'm seeing gremlins."

"You don't have to be nasty about it," said the gremlin. "We almost never associate with humans, though we hang around where they are, as it were. If you feel that way about it, I might as well get going."

Something prompted Hamilton to say, "Wait! Don't go."

"Why not?"

Hamilton thought for a second. He suddenly realized that, even living through the war and all—but on the home front in an "essential industry"—he had led a rather colorless life. The closest thing to a thrill he had ever had was his recent flight, and that was more unnerving than thrilling. He was in a rut, and exposure to a gremlin might make his life a little more, well, interesting.

"Fate," Hamilton said.

The gremlin looked puzzled. "What's that?"

"I said 'fate.' I meant Fate," said Hamilton, stalling while he sorted out his thoughts.

The gremlin said, "Now I don't follow what *you're* saying."

Hamilton smiled. "Look," he said. "It's got to be Fate. You just told me that it's rare for a person to see a gremlin. That you'd never heard of it. Right?"

"Well . . . yes."

"Now, you don't know that I've never been on an airplane flight before in my life. I almost wasn't on this one." He paused expectantly.

"So?"

"So what are the odds that we'd meet? Thousands to one? Millions? Figure it out."

"I still don't see . . ."

"The chances against it are overwhelming. Unless we were *meant* to meet."

The gremlin looked a bit dazed. "I don't know . . . that I believe in what you call Fate. But if there is some purpose we met, what could it be?"

What indeed? "Er, that's for us to find out."

"What?"

Hamilton pointed to where he left his gear. "Look there. That's camping equipment."

The gremlin pointed to the airplane he had recently vacated. "And that's a DC-3. So what?"

"You're missing my point," said Hamilton. "Fate again. I came here to have a week to myself. I'm not here on business. I'm free to do anything I want. We can explore the reason behind our meeting for a full week."

"Well . . ."

It took a little more persuading, but Hamilton finally got the gremlin to agree to go along with the idea. The clincher seemed to be when Hamilton said, "It might help you in your job," though he hadn't the slightest idea what it was that gremlins did except make trouble on airplanes.

The gremlin tagged along as Hamilton hired a car. He reminded Hamilton that hardly any humans could see him, and certainly not people who worked at airports, or he would have been spotted before.

Hamilton found a car he could rent and a map to the camping area. He piled

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his equipment in the rear seat and held the door open for the gremlin.

As they started down the road from the airport, the gremlin asked, "Where are we going?"

"To the camping area," said Hamilton. "How good are you at reading maps?" He handed over a small chart.

The gremlin looked at him curiously. "You know, you are really a strange one. You've obviously had no experience with little folk, but you're treating me decently."

"Is that so strange? And, by the way, what's your name? I can't just call you 'say, you,' or some-such."

The gremlin shook his head. "Amazing. You should be hostile, or scared, or maybe try to dominate me, but you haven't acted that way at all. Maybe that's why I decided to tag along with you." He settled back on the car seat.

Hamilton stared at the road. "I don't understand. If I had hostile feelings, I wouldn't have invited you along. I wouldn't have if I were scared, either. In fact, I wouldn't have talked to you. And I can't think of a good reason to try to 'dominate' you. What would you do? Give me your crock of gold?"

The gremlin stared at Hamilton, then settled back again. "It's leprechauns that have crocks of gold, not gremlins."

"Doesn't matter, anyway," said Hamilton. "Owning gold's illegal. Government regulation or something, since before the war."

Shaking his head as if to clear it, the gremlin opened the map. With a little difficulty, he smoothed it out. "What road are we on?"

"2A."

"Where are we going?"

"Silver Lake."

The gremlin studied the map. "We stay on this road until we come to the intersection with Route 16. Then we bear right. It's about ten miles."

"Thanks," said Hamilton. "You've still not told me your name."

The gremlin looked sideways at him. "You've not told me yours."

"Larry Hamilton. Lawrence Colby Hamilton, if you want to be formal."

The gremlin blinked. "Er, thanks. Do you prefer Larry?"

"Yes. And what should I call you?"

The gremlin sighed. "My full name is Robin Oberon Will Murphy."

"Murphy? The rest sounds very English."

The gremlin nodded. "The stock is mainly English, but some of the Irish *sidhe* blood is mixed in. We're a special little folk. We love high places, and after you humans built airplanes, we decided to move into them, though at best they are temporary homes."

Hamilton was about to speak when the car's engine began to sputter. The car slowed down.

"Just my luck," Hamilton said.

"Pull over to the side of the road," said Murphy.

"Why?"

"Give me a chance to check it out."

Hamilton decided it wouldn't hurt, and complied. Murphy sped out the window and disappeared under the vehicle. Puzzled, Hamilton got out and went to open the hood. He wasn't much of a mechanic, but he thought he should at least get a look at what was going on.

However, as he made ready to lift the hood, Murphy appeared from under the car. "Don't bother. I've fixed it."

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"What was wrong?"

"Dirt in the carburetor. Took just a second to fix."

Hamilton stared at the gremlin with respect. "You seem to know a lot about machinery."

Murphy laughed. "Of course I do. Gremlins have an affinity to mechanisms. We live on airplanes, after all. Compare this car's water-cooled straight six with an airplane's 14-cylinder double radial, and it's child's play. And you don't even have hydraulic boost on your steering."

"Do airplanes?"

Murphy climbed back through the window and sat down. "Sure they do. At least, some do. And we understand the lot—of Allied aircraft, anyway. I hear that there's a type of kobold that does our job in German airplanes, though I've never met one myself. Anyway, a car's nothing by comparison. Give it a try."

Hamilton pressed the starter button, and the engine roared to life. He put the car in gear and pulled out to the road. The engine purred steadily.

"That was great work, Robin."

"I prefer 'Rob.' Just like you like 'Larry.' "

"Fair enough," said Hamilton.

In due course, after a stop to buy groceries, they reached the campgrounds. Hamilton went in to register, and shortly came out with a camping permit. As he clambered into the car, Murphy climbed into the other side through the window. "You gave me a scare, following me in to the office," Hamilton told him.

"I didn't want to wait in the car. Besides, the ranger didn't see me."

"His cat did. You played with it."

The gremlin laughed. "Sure. We get along with cats. And the ranger didn't notice anything unusual."

Hamilton started to say something, but withheld comment as he started the car and got it back on the road. As they drove, he said, "I suppose all cats can see gremlins."

"They see most psychic things. They're the best at it, in fact," Murphy said.

"How about other animals?"

"*Hmph*. Well, dogs don't see us, but they can smell us and half hear us. Dogs are real good on things like ghosts and banshees, but only fair on little folk."

"That's interesting," said Hamilton. "But I mean, here we are, going out to a campground full of God knows what sort of wildlife. What about that?"

"No problem. The wolves, wildcats, and bears will sense me, but they won't bother me. So they won't bother you. After all, despite the fact that we gremlins are very mechanically inclined, we are children of nature."

Hamilton wondered whether that would apply to things like ants and mosquitoes, but thought it would be better not to bring it up.

Shortly they arrived at the campsite. Hamilton was relieved to see that there were no other campers visible from his site. After unloading the groceries, Hamilton pulled out his camping gear and started to set up a tent.

"Anything I can do?" said Murphy.

Hamilton regarded the gremlin. "Could you gather kindling? I'd like to build a fire later."

"Sure."

In due course, Hamilton had the tent up and his sleeping bag unrolled. Mur-

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phy had not only gathered kindling and some larger pieces of wood, but had cleared an area so that a fire could be built safely.

"That's good," Hamilton said. "Have you camped before?"

Murphy looked up at him. "Not with humans. All of the little folk know something about campcraft, however. Part of our heritage."

Hamilton assembled a folding chair and sat down. He pointed toward a cereal box. "That might make a good chair for you."

"It'll do," said Murphy. "What's next?"

"Oh, after I rest for a few minutes, I'll get a small fire started and then put on some water for coffee."

In a gratifyingly short time, the water was hot. Hamilton poured a regular-sized cup of water for himself, and a smaller cup from a toy set he had purchased at the general store for Murphy.

"Water?"

"I'm using this new powdered coffee."

Murphy said, "I had some of the stuff in the war. Not very good, as I remember."

"It's passable," said Hamilton. "Its one virtue is it takes up little space when you're camping."

Hamilton went back to his chair and sipped his coffee. He leaned back and sighed.

Murphy took a sip out of his little cup. "Not too bad," he said. "Now what do we do?"

"Well, the idea of going camping is to get away from your problems for a while and enjoy nature." Hamilton set his cup down and hooked his fingers behind his head. "I'll forget all about jobs and such for the next few days."

Murphy arranged himself into a comfortable position. "Just what do you do?"

Hamilton smiled. "I'm with a manufacturing concern. We make ball bearings. I'm in the advertising department."

"Advertising?"

"Sure. You must have seen ads. Or don't you read?"

"Now how could I have helped you with the map if I couldn't read?"

"Sorry," said Hamilton. "You take a lot for granted with other people, don't you? Didn't mean anything by it; I just wasn't thinking."

"Oh, that's okay. Yes, I've seen ads here and there. I just don't quite understand them."

"In what way?"

"Well, look at it this way," Murphy said. "You say your company makes ball bearings. So do other companies. Your company's bearings pass government standards, don't they?"

"Well, yes."

"Do your competitors'?"

"Sure, but . . ."

Murphy said, "That's what I don't understand. I understand machines, and I understand nature. But advertising I have never been able to figure out."

"Well, I guess it wouldn't matter in your line of work. What *is* your line of work, by the way?"

Murphy stared hard at Hamilton. "Do you really want to know?"

"Certainly."

Murphy got up and began to walk back and forth. "Well, I'll skip most of the theology, because it would bore you to tears. Let's just say that many

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of the . . . psychic . . . folk who people know about have not only their own activities to do, but interact with humans in various ways. Keeps us from being damned. Brownies, for instance, help people with housework. Didn't used to be that way, but in the Middle Ages they adapted to their new mission. Some elves make shoes; others toys. I guess you get the idea."

"Sure."

Murphy paused. "Gremlins—*ahem*—have been given the mission of keeping humans— particularly airmen—on their toes. Alert."

"How do you do that?" Hamilton was intrigued.

"Well, take the flight you were on. That pilot had made it dozens of times without incident. He could get careless. So my job that time was to mess up the mixture control, which I did. Made him pay closer attention to his airplane."

"Isn't that dangerous?"

"Any human activity worth its salt should have a *little* danger associated with it. But generally we keep things within bounds.

"Oh, there are a few bad gremlins —there are bad humans, too—but for the most part we don't make things too bad. Just enough to keep things from being taken for granted. If things really get dangerous, we sometimes lend a hand."

Hamilton nodded. "Sounds like an interesting, er, profession. That's why you were intrigued when you upset me."

"That's right. I thought it was knocking you out of whatever your rut is," said Murphy.

"It may very well be doing that," said Hamilton. "But somehow, I sense that *you* need help. I'll bet that's why you really came with me."

Murphy stopped walking. "What makes you say that?"

"I don't know. Maybe it has something to do with being born on Saturday. You'd be the expert on that. *Is* there something bothering you?"

The gremlin sat down and sighed. "Yes."

"And that is?"

Murphy looked very unhappy. "Look at me. How many of us do you suppose there are?"

"Oh. Dozens. Maybe hundreds?"

Murphy shook his head. "Close to a million. There were some of us in the first war, but aviation really didn't start to grow until that fellow Lindbergh flew the Atlantic solo. Then everybody started to take it seriously. Before the war we just finished, we just naturally . . . multiplied . . . to fill the needs of the Allied air forces."

"Er, how did you do that?"

Murphy laughed. "The same way you humans do. We gremlins are the males. There are also females, called fifinellas. And dingbelles, though those are ground-based. The fifinellas spent a lot of time with the WASP ferry pilots—you know, those women who flew airplanes to air bases during the last war.

"Anyway, we increased our population manyfold. And now it's peace. Not that we're against peace, but there are a lot fewer airplanes flying than

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there were during the war. So a lot of us are out of jobs."

Hamilton felt sorry for the gremlin. "Look here," he said. "I read in the paper the other day that there will be a lot of civilians taking up flying soon, and . . ."

"Do you think we haven't taken that into account?" Murphy was scowling. "We checked that right after the war. There's no way that civilians are going to take up the slack."

"Hmm," Hamilton said, "let me see. Is flying all you like?"

Murphy spread open his hands. "What would you have us do? Make shoes? There are elves for that."

Hamilton thought. "Give me a chance, Rob. You just told me your problem. Let me chew on it for a day or two."

"I've been chewing on it since 1946," said Murphy, somewhat mournfully.

That evening, when Hamilton started to feel sleepy, he said he was going to turn in. But first he went to one of his bags of provisions and withdrew a blanket.

"What's that for?" said Murphy. "You've got a sleeping bag already."

"I have, but you don't. However, if we fold this properly, it'll make a good substitute."

"Well, thanks. But I'd like to sleep close to the car. I like to be around machinery. It's in the blood."

Hamilton suggested that the makeshift sleeping bag could be set up in a sheltered area next to the car. Murphy agreed, and so it was done.

The next morning, after a breakfast of coffee and biscuits, Hamilton explored the stream, accompanied by Murphy. They walked along the bank in relative silence, each lost in his own thoughts.

The relative quiet of the surroundings was broken by the distant roar of an engine. Murphy listened intently.

"What's up?" said Hamilton.

"Truck. Not very well tuned. Whoever's running it will have trouble within a month."

Hamilton said, "You really know a lot about engines and things. How did you learn it? Go to gremlin school?"

Murphy looked at him in amazement. " 'Gremlin school'? Where on Earth do you *get* your ideas? We pick up our knowledge in a practical manner, hanging around airfields. We learn by doing."

Hamilton stopped walking. "You mean you've got no formal education?"

"Hey! I'm a gremlin. Who would teach me?"

Hamilton said, "Wait a minute . . . I'm beginning to get an idea. Maybe it was Fate, after all."

"An idea about what?"

"Why, your problem. Look, Rob, this is 1948. All kinds of interesting things are beginning to happen. The Army is launching rockets into space. People are beginning to use radar. I read of an electrical brain—ENIAC or something—that's being built. People are splitting the atom."

Murphy looked at Hamilton, and started to catch a bit of his excitement. "Yes? So?"

"So look at it this way. The world that is coming is going to be *mechanized*. Not just a little, but a lot! There are whole new areas for your people to explore, not just airplanes."

Murphy said, "Well, we do like to fly, but we *love* machinery of any sort.

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Maybe you've got something there. Just maybe."

Hamilton resisted the impulse to pick up the little one. "Look. The only way to learn about all the new stuff in time is to go to school. Human school."

"But . . ."

"Oh, come on! You don't have to register or anything. Just sit in the classrooms and absorb it. Encourage your fellow gremlins to do likewise."

The little being thought about it for a long time, almost too long for Hamilton's comfort. Then he said, "It's worth a try. Let's get back to camp."

Hamilton broke camp that noon. He sped back to the airport, and luckily was able to hop a flight back to the city. Murphy was with him, of course, but he disappeared from the cockpit several times, and the pilot who gave him a lift told Hamilton that he had never experienced such a trouble-free flight.

In the next few days Hamilton haunted the public library, looking up undergraduate programs in various college and university catalogues. If he seemed to talk to himself from time to time, the librarians didn't mind, as he always whispered.

On Saturday, Hamilton was back at the airport with Murphy. He looked at the little gremlin and said, "Well, I guess it's so long."

"Not forever, Larry. Just until I've tried this idea of yours out. It could mean so much for my people." The gremlin looked at the ground shyly. "I'll be back."

"Good luck, Rob," said Hamilton, who was sad to see the gremlin depart.

"Thanks," Murphy said. Then he grinned. "If it only works! It'd sure beat making shoes."

As Hamilton watched, the gremlin scuttled across the tarmac for an airplane that both knew was headed to a city with one of the country's finest engineering schools.

One June night a few years later, Larry Hamilton was listening to a long-playing record when he heard the doorbell ring. He went to the door and opened it. He saw nobody, and was about to close the door when a familiar high-pitched voice said, "Larry! Down here!"

Hamilton dropped his gaze. *"Rob!"* He squatted, to be more nearly level with the gremlin. "It's really you. You're looking great. Come in."

As the gremlin entered the house, Hamilton said, "There's coffee that's still hot, if you want any."

"Well, thank you."

The two repaired to Hamilton's kitchen. As Hamilton poured coffee into the small cup he had saved as a keepsake from his camping trip, he said, "Well, tell me the news. How did it go?"

The gremlin smiled. "Your idea was right on target," he said. "I learned an awful lot. I'm a quick study, too. I got enough to understand that there are all kinds of ways we gremlins can be useful."

"Well," said Hamilton, "there is another war now . . ."

The gremlin shook his head. "Not a very good one, and not big enough to absorb all of us. It isn't going to last forever, either."

Hamilton poured himself some coffee

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and sat down. "Well, what are your people doing now?"

"Of course, a lot are in airplanes, but a lot more are in school. Someone with your sight would see that some classes have more than double the number of students they are supposed to have. And since they don't have to take 'required' nontechnical courses, they're 'graduating' a lot faster than the humans.

"Some of them are going into mechanical engineering; others into electrical. It's great, Larry. You've opened whole new worlds to us. We'll keep humanity on its toes, as we were meant to, thanks to you."

Hamilton felt very proud. He had not only solved the problem of surplus gremlins, but he had done something that would ultimately benefit the human race.

"Do you have an overall plan?"

The gremlin nodded. "We've decided we'll treat any mechanism the same way. If there's any leeway in the way it's put together, we'll make sure that the most unwelcome performance will result. People will have to take special precautions to make sure that nothing can go wrong; otherwise it will."

Hamilton nodded. "That's good. The idea should work in any field, it seems to me."

"Sure. We can use the principle in any machine-based field of activity." The gremlin smiled. "It's a good principle, and the other gremlins have named it after me. *My* principle."

Hamilton thought of many things, not the least of which was his part in making it all happen. He was quite pleased with the way things had turned out. Yet . . .

"It shouldn't be a 'principle,' Rob."

The gremlin looked surprised. "Not a principle?"

"No," said Hamilton. "A law. Murphy's Law."

"I'll buy that," said the gremlin happily. ■

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Paul Howard plunked his breakfast down on his desk: two plastic-wrapped vending-machine Danish and a snap-lidded plastic cup of vending-machine coffee. Some day, he kept telling himself, his company would turn enough of a profit that he could afford a decent breakfast.

He flipped the switch on the computer terminal next to his desk and reached for the telephone handset. He punched in the number for the local node of The Link ("It links you to a universe of information") and waited for the computer to respond. When the reply appeared on the screen, he logged on and typed in his password.

While he waited to be recognized, he ripped open a Danish and took a bite, then washed it down with a slug of overly hot coffee. Ugh, he thought, this roll tastes like the plastic it's wrapped in, and the coffee is too weak to taste.

The computer displayed a menu of choices, and he tapped in a request for the morning's stock market report. The electronic pages started flipping across the screen, each page pausing just long enough to let him see what part of the alphabet he was in. When the Cs started coming up, he punched the keyboard to freeze the display. He found that he had stopped one page too soon, and called up the next page. There it was, COMPUTERCOM, up five points since yesterday. Yesterday's late-afternoon announcement of a sale to one of the largest motel chains in the country had touched off a flurry of buy orders this morning. On paper he was thirty thousand dollars richer than when he went to bed last night. That and fifty cents.

PANDORA'S PRINTOUT

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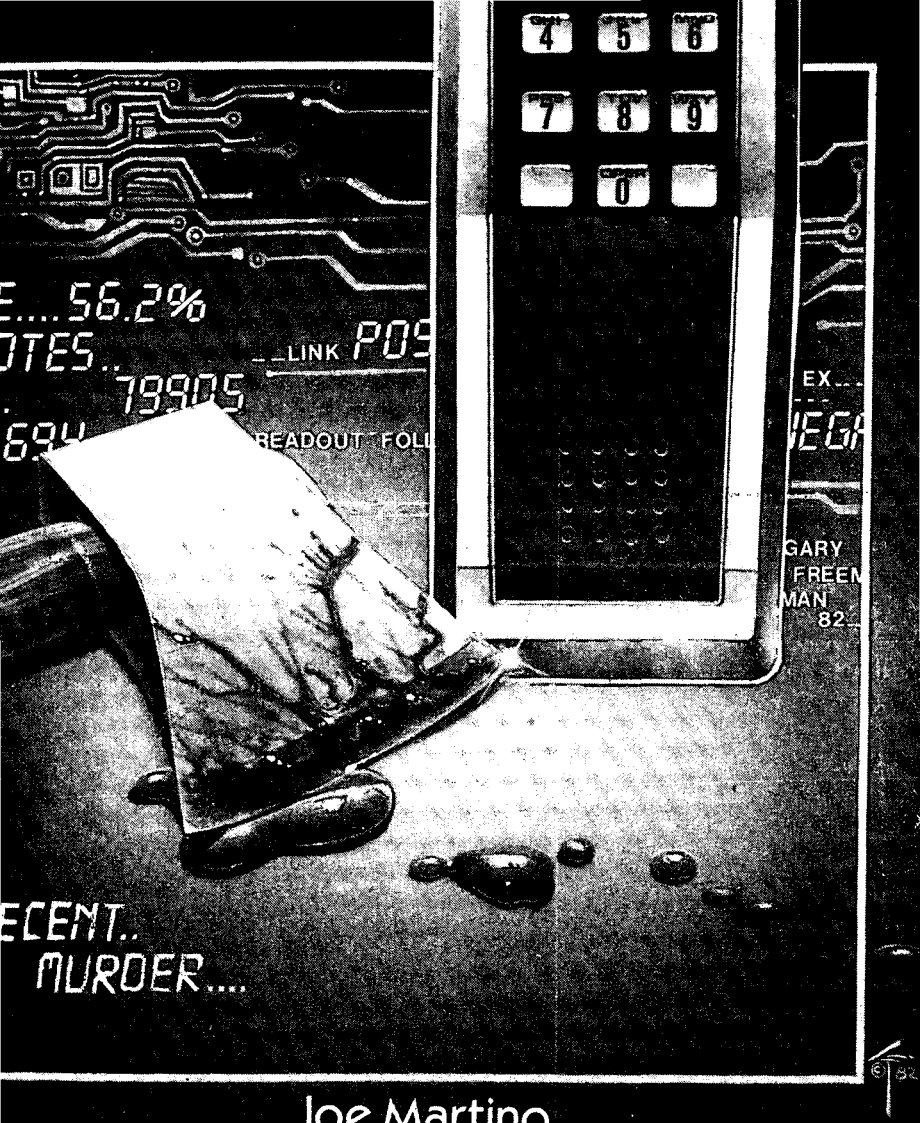

Joe Martino

What people want and what they say they want may be two different things—but they may not realize that until what they said they wanted is thrust upon them.

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he reflected, would get him a cup of vending-machine coffee.

Satisfied with the stock market report, he called up the AP newswire and settled back to watch while he finished his breakfast. He gave only a passing glance to the first several stories as they scrolled by. Then one caught his eye, and he leaned forward to read it more carefully.

Capitol City, April 3. Governor Wilkinson's press secretary, Archibald Morgan, today announced that an appeal to commute the death sentence of convicted axe-murderer Sam Corrigan had been received by the governor. Morgan also admitted, in answer to questioning by reporters, that Governor Wilkinson was receiving an unusually large amount of mail both for and against commuting Corrigan's death sentence. Morgan, asked when the governor would make his decision known, only commented: "I'm certain he will make his decision public as soon as it is firm."

Capitol City, April 3. Ransome Whitford, Executive Director of the League for Penal Reform, today announced a campaign to circulate petitions for commuting the death sentence of Sam Corrigan. In his press release, Whitford said, "The death penalty is barbaric. Execution never reformed anyone. It is unbecoming a civilized society. The people of this state have long opposed the death penalty, and now is the time to bring it to an end. We are urging all concerned citizens to sign our petitions, and to send telegrams to the governor requesting a commutation of the death sentence of Mr. Corrigan."

Capitol City, April 3. Harry Schwartz, chairman of the Law and Order Foundation, held a press conference today to announce a campaign to support the execution of Sam Corrigan, convicted axe-murderer. In his announcement, Schwartz said, "The murder occurred three years ago. Corrigan was caught red-handed, literally with his hands covered with the victim's blood, and he received a prompt and speedy trial. He was convicted and sentenced to death. For nearly two and a half years, his execution has been postponed for appeals, hearings, and procedural delays of one kind or another. The whole thing is making a mockery of our judicial process. Talk about commuting the sentence to life imprisonment is just empty noise. In six years he will be eligible for parole, and if experience is any guide he will be back out on the streets in eight years, ready to strike again. The common people of this state are sick of revolving-door justice which sends hardened criminals back into society almost as soon as they are caught or convicted. Remember, Corrigan was out on parole from an assault conviction when he committed this murder."

Terry Conway yanked the office door open and charged through. Terry had been Paul's classmate at MIT and was his partner in the invention COMPUTERCOM was founded to make and sell. Between them, Paul and Terry held forty percent of COMPUTERCOM's stock, and had elected themselves President and Treasurer respectively.

"Terry, did you see the stock market news?"

"Yes. It's gratifying. That ought to keep the wolf away from the door for a while longer."

"Not to mention staving off a stock-

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holder's rebellion. We've got to start turning a profit, or we'll find that we're the youngest ex-president and ex-treasurer in the computer industry."

Paul opened the other Danish, took a bite, and washed it down with a swallow of coffee. "Terry," he said, "have you seen the morning news about Sam Corrigan?"

"Haven't had a chance to."

Paul put down the remainder of the Danish and leaned toward the terminal. With a few keystrokes he brought the news items back on the screen. Then he sat back to let Terry have a look.

"Seems to be a hot issue," Terry commented. "If the governor is getting a lot of mail, people must be concerned."

"I'm sure they are. But look at these self-appointed public spokesmen telling us what we ought to do. I wonder what the people of the state really think."

"No way to know, I guess. I'm sure Governor Wilkinson would like to find out. He's a politician to the marrow of his bones. He'll go whatever way the public seems to be leaning. I imagine he has some private polls under way now to sound out public opinion."

Paul shot upright in his chair. "Say! Why don't we find out what the public really thinks about this?"

"You mean us, personally?"

"Yes, I mean us. Let's find out what the people really think."

"How? We can't afford a public opinion poll. Those things are expensive."

"Dummy, I don't mean a public opinion poll. I mean use that gadget we're selling. Hook it up to our computer, and have people call in. They could dial or press a '1' for commuting the sentence, and a '0' for execution. Our translator would then interpret the vote and feed it to the computer, which would tally it."

Terry looked at him for a long moment. "You're crazy, Paul. Why on earth should we do that?"

"Just to demonstrate that we have the technology today to allow the people to voice their opinions on controversial issues. We don't have to sit around listening to a bunch of self-appointed spokesmen telling us what the people think."

Terry was silent again. "You know," he finally said, "it sure would be good publicity for our gadget and for our company."

"Oh, forget about the publicity for our gadget. This is a chance to show the country how the technology we have today can be used to solve important social problems. It can change the way we live."

"Okay, Paul, I understand your idealism. I agree with you it would be wonderful if the country started taking advantage of technology instead of allowing it to sit idle while people did things the hard way, or in ignorance of the facts. But we have to be practical. This is just too big a job for us to handle. How many calls would you expect? Would you want this electronic referendum of yours to be limited to this state only, or would you want to go nationwide?"

"I would think we'd want to go nationwide, just to show what can be done."

"Okay, how many votes would you expect?"

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Paul thought a moment. "Well, there were about sixty million votes in the last presidential election."

"Right. And if we got only a tenth that many, we'd be swamped. You've got to be realistic about what we can do, Paul."

"Well, I still think it's a good idea."

"I'm not saying it isn't. But it's too big for us to handle. Now if you don't get busy on the production backlog, that motel order is going to be too big for us to handle too, and our stock is going to drop right back down again. The stockholders will be out after our blood."

"Okay, Simon Legree. I'm heading for the salt mines." He swallowed the last bite of the Danish, followed it with the last of the coffee, and got up from his desk.

Lunchtime found Paul and Terry back in the office they shared. They had bought sandwiches from the lunch-wagon which stopped in the company parking lot, and were seated at their desks eating them.

"Looks like we're in for some more April showers," Paul remarked.

"It does," Terry responded. "Do you suppose the rain'll hurt the rhubarb?"

"Not if it's in cans."

"Wonder how old that joke is," Terry said. "It must be as old as the hills."

"Can't be any older than canning," Paul replied. After a pause, he continued. "You know, there's an invention which really changed the way people lived. It's hard to imagine what life was like without a cheap, reliable way of preserving food."

"Speaking of changing lives, I had a thought about that idea you brought up this morning. You know, the electronic referendum."

"Oh, what's that?"

"Why don't you use two phone numbers instead of one? If they wanted to vote one way they could call one number, and the other number to vote the other way."

"If I were simply interested in this one issue, I'd consider that. But Terry, I want a demonstration of the ability of our translator to decode telephone dial or tone signals and feed them to a computer. If you have more than two choices, or if you want more complex information from the caller, you have to have something like our gadget that makes a telephone into a computer terminal. We want to get across just how much capability current technology can provide."

"Well, even if you were willing to go along with the simpler idea, it's too big for us."

"Maybe not, Terry. When I got a few moments free this morning, I called a couple of TV networks. I asked them how many callers they got on their nationwide call-in programs. You know, when they ask their viewers to vote on which candidate won a debate, or something? Then I multiplied the number by ten just to be on the safe side. I figured that with about twenty or so translators running in parallel, we could handle it."

"But you'd swamp our computer, wouldn't you?"

"I don't think so. I haven't made the calculations yet. But even if it would, we could lease a bigger machine for the demonstration."

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"That would cost money, Paul. Money we don't have. The stockholders would probably be pleased with a good publicity-generating demonstration. They'd never hold still for spending more money. Besides, even if we used a bigger computer, how about the number of telephone lines we have? That's a limitation too. It's one we advise all our clients about."

"Yeah, that's a bottleneck too. Much as I hate to say it, I'm beginning to be convinced that we just can't handle the whole thing ourselves."

"Well, back to the mundane problems of earning a living. How's the motel order coming?"

"We've got some quality control problems. I'm trying to track them down."

"That could be bad. If we foul up on our first big order, we may never get a second chance."

"Don't I know it. I'm going to spend all afternoon locating the source of the problem."

What was nominally quitting time found Paul and Terry back in their office again.

"Good news," Terry announced.

"What's that?"

"Two more fairly sizeable orders. Neither is near as big as the motel order, but they're bigger than anything we had before that."

"Maybe things are beginning to turn up for us."

"I hope so. I'm tired of being treasurer of a nearly empty treasury. It sure would be nice to sign some decent paychecks for us."

"Maybe the demonstration of the electronic referendum would help."

"Sure it would help, if it could be done. Any demonstration of successful use would help. That's why the motel order is so important."

"Terry, I think we can handle the referendum. This afternoon I talked with the phone company about what we'd need. They would have to modify one of their standard services, but it could be done. They said they'd give me a quote tomorrow."

"You're kidding me."

"Not a bit of it, Terry. The thing looks completely feasible, and our computer is large enough."

"Well, I hope you're not too discouraged when you get the quote from the phone company. It'll probably be astronomical."

Paul and Terry managed to miss seeing each other all the next morning. The first time they were in the office together was at lunch.

"No sandwich today, Paul? You trying to lose weight or something?"

"No, I decided I'd better have soup and save my money. I needed some unexpected repairs on my car and that used up money I hadn't planned on spending."

"You ought to replace that clunker. It's probably costing you more than a new one would."

"True, but I can't afford the down payment. Maybe next month."

"Well, if things keep looking up, maybe the company can afford to pay us what our salaries are supposed to be."

"We got some new orders?"

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"No, but there were several inquiries this morning. Responses to our display at the electronics show in New York last month."

"I told you that was money worth spending."

"We'll see. I don't have any actual orders yet. But we do need to get more publicity. Maybe we're ready for an ad in a trade journal."

"No, the perfect publicity is an electronic referendum."

"You back on that again, Paul?"

"Sure. I know you won't be turned on by my real reasons for wanting to do it, so I have to keep talking in terms of publicity."

"Well, one of us has to be practical. You seem to have this obsession about changing society with modern technology. That's fine, if you can get someone to pay for it. Right now I'm the one who has to worry about getting orders."

"Well, I heard from the phone company today."

"How much did they want? Ten percent of our net worth?"

Paul reached for a slip of paper which was lying on his desk and read off some figures.

"You're kidding me! That's high, but it's not out of reach. We've paid more for advertising already."

"Trouble is, though, they want a week's notice if we decide to go ahead with it."

"What's wrong with that?"

"It's not as timely as I'd like. I'd like to have an answer today."

"But you can't have an answer today. And a week isn't bad. Especially since we have to get word out to people so they'll know to call in and vote."

"You're right! I hadn't thought of that. We need some kind of advertising campaign for that, which will cost more money."

"Paul, you ninny, we don't have to pay for advertising this."

"Then how do we get the word out?"

"Simple. We call a press conference and issue a press release. Sometimes, Paul, you don't show any business sense at all."

"That's what I have you around for, Terry. One of us has to think about business matters. I have enough problems just making the technology work."

Terry had been right about the press conference. On the advice of a friend at the local TV station, they had timed the conference properly to make the east coast evening news on all the major networks. The only serious questions they had received had come from one of the wire services.

"Who gave you permission to conduct this referendum? Do you have the backing of the governor?"

"We don't need anyone's permission," Paul had replied. "Do Gallup or Roper need anyone's permission to take a poll? We're spending our own money on this, and we don't need anyone's approval to go ahead."

"But why are you doing it? What's the point of it?"

"We want to demonstrate what existing technology can do. We think it's time the United States got out of the horse and buggy era of politics and caught up with the twentieth century. We want to show that electronics can change the way our society works. We can use modern technology to let the

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people speak instead of having to depend on samples—or worse yet, having to depend on those who claim to speak for the rest of us. That's why we're doing it."

It took two days for reaction to the press conference to develop. Paul and Terry were eating breakfast at their desks, and Paul was catching up on the news via The Link. From force of habit he checked the stock market first.

"Good news, Terry. Yesterday's trading put us up another five points. That press conference is beginning to pay off."

"That ought to keep the stockholders off our backs for a bit longer. Any other reaction?"

"I'm going to run a search for news items related to Corrigan and our electronic referendum." He put his coffee cup down, leaned forward, and punched a few keys on the terminal. There was a pause, then words started appearing on the screen.

"Hey, Terry, we're getting something. Say, look at this!"

Capitol City, April 8. Governor Wilkinson announced today that his decision on whether to commute the death penalty for Sam Corrigan would not be affected by the forthcoming electronic referendum. "I'll do what is right," he said, "and I'll pay no more attention to this than I do to letters to the editor or public opinion polls. This is too serious a matter to be left to such influences."

"Who's he trying to kid?" Paul said. "Everyone knows he won't make a move until his private pollster has found out which way the political wind is blowing."

"It makes a good story, and some people may actually believe him."

"Here comes another one."

Capitol City, April 8. Leopold Hough, state chairman of the opposition party, today commented that if Governor Wilkinson won't listen to the voice of the people, the people would replace him next November with someone who would listen. "Who does he think he is, anyway?" Hough said. "He's responsible to the electorate, and our party intends to hold him responsible or give the people an alternative."

"More political eyewash!" Paul snorted.

"That's redundant," Terry replied. "Wait, what's this coming up?"

University Center, April 8. Professor Russell Kirkham, of the political science department at Southeastern University, today made these comments on the proposed electronic referendum. "I think it's dangerous. The Constitution makes no provision for such a thing, and it represents a radical departure from past political practice. I hope the gadget-happy people who proposed it will have second thoughts and refrain from throwing this electronic monkey wrench into our political machinery."

Paul slammed his fist down on the desk. "What nonsense! Of course the Constitution makes no provision for an electronic referendum. Jefferson and Madison never heard of computers. That creaky and archaic Constitution we're saddled with doesn't even make provision for the automobile and the airplane, let alone TV and the computer. What's he trying to pull, anyway?"

"Looks like we stirred up a hornet's

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nest, doesn't it? Maybe some other news items will be more favorable."

The next one was no improvement, though.

Capitol City, April 8. Ransome Whitford, executive director of the League for Penal Reform, today released a statement opposing the use of an electronic referendum to decide the fate of convicted axe-murderer Sam Corrigan. "Capital punishment is inherently barbaric. It should not depend upon whether the barbarous yahoos are outvoted by the decent citizens. The very idea that we should have a referendum on the subject is appalling to all decent people."

Another one scrolled upward on the screen, but it was no more encouraging.

Capitol City, April 8. Harry Schwartz, chairman of the Law and Order Foundation, in an interview today opposed an electronic referendum on capital punishment for convicted axe-murderer Sam Corrigan. "The crime he committed deserves the sentence he received. There are always people who have a soft spot in their heads for the criminal, but no sympathy for the victim, and no sense of outrage at the crime. We can't let the votes of these people outweigh the votes of law-abiding ordinary citizens. A referendum on this subject is just totally inappropriate."

Paul broke the connection to The Link, and switched off the terminal. "I'm beginning to be sorry I picked this subject to demonstrate the capability of our gadget. The original idea is being lost in the controversy. If it weren't for the fact that we've already paid the phone company to set up the switching arrangement for us, I'd be tempted to drop it and try again on something else."

"I don't think it would have mattered what subject you'd picked," Terry responded. "If it were controversial enough to stir interest, you'd run into the same problem. And if it weren't controversial, then there would be no point in a referendum.

"Besides," he added, "it's the controversy that is gaining us recognition. Without the controversy we wouldn't have had that five-point rise in our stock. We can't back out now. Our stock would drop like a stone, and the stockholders would get rid of us."

"I have the uncomfortable feeling we're riding on a tiger. And you recall what happened to the Lady from Niger when she tried that."

"Let's not borrow trouble, Paul. Remember, if we weren't optimists, we wouldn't have started this company in the first place. Just believe everything's going to work out okay.

"By the way, how's the production backlog coming?"

"I think I've got it about whipped. We're getting another shipment of parts in today, and that ought to see us through for the motel order plus what we need for the referendum. Provided no other problems crop up, that is."

"Good. I'm glad to hear that. Want to go out and celebrate tonight?"

"Champagne and caviar?"

"Considering the state of the treasury, it'll have to be pizza and beer."

"Okay, that's the best offer I've had all day."

As Paul walked in the door to the

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office, Terry greeted him with, "Hi, celebrity."

"What's that you called me? 'Celebrity'?"

Terry turned around and picked a slip of paper off his desk. He held it out to Paul. "You had a call from NBS. Tom Donovan wants you to call him back at this number."

"National Bureau of Standards? I don't know anyone there. Who's this Tom Donovan?"

"No, you dummy, the TV network. Tom Donovan is the host of their interview show, 'Face the Issues.' He wants you to appear on the show this Sunday afternoon."

Paul waved the paper away. "They'll have to do without me. I'm too busy. I can't afford the time."

"That's where you're wrong," Terry replied. "The one thing you can't afford to do is *miss* appearing on that show."

"Why?"

"First, we need the publicity. Publicity for the company, for our little gadget, and for the referendum. In that order. Second, they're going to have a bunch of people on there who will give all kinds of reasons why we shouldn't hold our referendum. You need to be there to defend us."

"So, they're setting me up to take me apart? They're putting me into the arena with the lions?"

"Isn't that the way those shows are always run? You'll be lucky if Donovan stays neutral, instead of joining in the attack on you. As far as he's concerned, you're a public figure and therefore fair game. But if you don't go on the show and defend what we're doing, the other side will get all the air time."

"Well, okay. I'll do it. Give me that number."

"Here. Then, after you call Donovan, you'd better take some time away from thinking about our production problems and start thinking about what you're going to say on the show. And listen, Paul. Sometimes you come across as a technology fanatic. As someone who would advance technology no matter what the consequences. I've known you long enough that I don't think that's really true. But if you're not careful on the show, you're going to give the audience that impression. So watch it carefully."

"Okay, Terry. And thanks for the warning."

Tom Donovan's familiar, ruddy face filled the TV screen.

"Good afternoon, ladies and gentlemen, and welcome to 'Face the Issues.' This afternoon we are going to face the issue of an electronic referendum on a pending capital punishment case. With us to discuss this issue is Paul Howard, the young electronic wizard who brought up the issue in the first place," and at this the camera cut to show Paul's face. "We also have Ransome Whitford of the League for Penal Reform, and Harry Schwartz of the Law and Order Foundation." The camera showed their faces, one after the other. "And finally, we have with us Russell Kirkham, professor of political science at Southeastern University. Professor Kirkham is the author of several books and numerous scholarly articles on the Constitution." Kirkham's face appeared on camera, while Donovan continued. "Professor, it is a pleasure to have you back on the

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show. As a widely respected authority on the Constitution, I am sure you will have much of value to say to our audience."

The scene expanded to show all five seated at the table, Donovan in the middle.

"Since you are responsible for this issue, Mr. Howard," Donovan continued, "we'll let you start off by describing the issue as you see it."

"The issue, as I see it, is both very broad and very simple. It's broad in that it transcends this specific case of the execution of a particular convicted murderer. It's simple in the following way. Democracy has never caught up with modern technology. In the late twentieth century we are still trying to run a large nation with methods appropriate to a small and predominantly rural nation of the eighteenth century. I simply want to bring us up to date. I want to allow democracy to use the technology we have today." With that he sat back and rested his hands on the edge of the table.

Donovan turned to Whitford. "How do you see the issue?"

"Mr. Howard may possibly be correct about the ultimate issue at stake, but I believe he is overstating the case for the moment. What we really have here is a referendum on capital punishment. The trouble is, it's not a well-thought-out referendum. It's not even a scientifically designed poll, since there is no control over who votes. It's nothing but a glorified call-in show."

"Mr. Schwartz?" Donovan asked.

"I rarely agree with Whitford or his League on anything," Schwartz began, "but I think I do on this one. I agree it's a poorly run poll on capital punishment. I think the philosophical overtones Mr. Howard talked about are so much eyewash."

"And you, Professor?" Donovan turned to Kirkham. "How do you see the issue?"

"I think Mr. Whitford and Mr. Schwartz are taking too short-sighted a view of the issue. Mr. Howard is right. This is of Constitutional significance. It transcends not only this particular execution, but the issue of capital punishment itself."

"We seem to have several versions of the issue," Donovan said straight into the camera. "Let's start the discussion with you, Mr. Whitford."

"As far as I'm concerned," Whitford responded, "capital punishment is the issue. Executing a murderer is simply an act of vengeance. It reduces society to the level of the murderer himself."

"That's nonsense," broke in Schwartz. "A murderer is executed only after a prosecutor has brought him to trial before an impartial judge and jury, where the accused is defended by his own lawyer. You're trying to equate that with a situation in which the murderer acted as his own prosecutor, judge, jury, and executioner, in which the victim had no one to defend him, and has no opportunity for an appeal. It won't wash. They're simply not equivalent."

"Granted there are all those safeguards," Whitford responded, "but judges and juries make mistakes. Even a supposedly impartial judge and jury can railroad someone, despite the fact he has a lawyer there to defend him."

"Of course injustice can happen," Schwartz shot back, "but by the same

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token, there have been private killings where the victim fully deserved what he got. Justice was done even without benefit of prosecutor, judge, and jury. But you can't go by the exception. You can't use the occasional injustices by judge and jury to rule out capital punishment, any more than you can use the occasional justified private killing to support people taking the law into their own hands. The objective should be fair trials, not an end to the death penalty."

"Please, gentlemen," Donovan broke in, "we're not here to discuss the justice of capital punishment. We're here to discuss the issue of this electronic referendum on a particular execution. Or," he added, nodding to Paul and then to Kirkham, "in general."

"Very well, Mr. Donovan," Whitford responded, "I'll stick to the issue as I see it. I'm against the electronic referendum, especially in this case. The murder in question was a particularly brutal one. Public opinion is bound to be inflamed. I don't think that kind of emotionalism should be allowed to sway the decision."

Schwartz spoke up next. "That makes twice today I'm going to agree with Whitford. Maybe I'm getting soft in the head. But I don't want a lot of emotionalism in this decision either. However, I don't think the public is likely to be easily inflamed. I think they're too easily swayed by appeals to soft-heartedness. There will always be those people Mark Twain referred to as having permanently impaired waterworks, who will be all too ready to weep over the plight of the convicted murderer and vote against executing him, no matter how much he deserves it."

Donovan turned to Paul. "We'll let you have a say next, since this is really your idea anyway."

Paul sat up in the chair, smoothed his hair with one hand, realized what he was doing, and folded both hands in his lap. Then he spoke.

"We live," he started slowly, as though he were choosing each word with care, "under a Constitution which was written two centuries ago, for a nation which consisted of a narrow strip of land along the Atlantic seaboard. The inhabitants were mostly farmers. Communications went no faster than the fastest horse, and trade went even more slowly. Life went on at a more leisurely pace than it does today, simply because of the low technology available.

"The Constitution reflects that slow pace. Oh, it's been speeded up a bit. Originally the president was elected in November and inaugurated the following March. That was to allow for slow travel during the winter. Almost sixty years ago we moved the inaugural up to January. With today's technology we could move it up even sooner after the election.

"The Constitution is full of delays which weren't noticed, or even important, at the time it was written. Technology has made it obsolete. Dictatorships could always move faster than a democracy, but technology still limited them. Their horses and wagons got stuck in the mud just as deeply as a democracy's did."

His words started to come more rapidly, and his face became animated.

"But the world moves faster today. Dictatorships can not only make decisions faster, they don't get bogged down

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in the mud anymore. If democracy is to survive, we must adapt to today's world. As I said at the outset, I want to bring democracy up to date, and allow it to use today's technology. I picked this particular issue because there were so many people, all saying different things, and each claiming to speak for the public. That's nonsense. We have the technology to find out what the public really thinks. Let's use it. For me, this is a test case. It will demonstrate that democracy can be updated. Electronic democracy is the only way we can counter electronic dictatorships."

Donovan turned to Kirkham. "Professor, do you have a response to that?"

The camera switched to Kirkham, who leaned forward and began to speak in calm, measured words.

"Yes, I do. Mr. Howard, you have spoken eloquently and I'm sure sincerely. However, you have made an incorrect statement and it invalidates your entire line of argument. The Founding Fathers did not write a Constitution *for* a small agricultural nation. They wrote one *in* such a nation. Their vision was not constrained by the limits of the United States of their day. They knew Greek and Roman history. They knew the history of Europe of the Middle Ages, as well as the history and culture of the Arab and Eastern worlds. They knew the writings of philosophers from Plato to Locke, Ferguson, and Smith. In fact they knew more about the history and philosophy of politics than do most so-called educated people of today.

"In particular, they knew the history of every democracy which had ever existed, and they knew what made them all collapse. They designed a government which they believed would hold up under the stresses and strains which had destroyed every other democracy in history. They built for the ages, not for the local circumstances of their day.

"Of course, they accommodated their ideas to the reality of the day. The delay from November to March for the presidential inaugural is only one example. As you point out, that was shortened because it no longer made sense. However, it can't be shortened much more. Despite all the technology of which you are so justly proud, it still takes a new president about two months to get his government organized and ready to be inaugurated. The procedural delays of which you complain are not simply relics of a slower-paced age. They were deliberately designed for a specific purpose."

The camera view expanded to show the five participants. Whitford and Schwartz were listening raptly to Kirkham. Even Donovan and Paul were leaning toward him, as if to capture every word.

"Consider!" Kirkham continued. "Under our Constitution, a determined majority can control the House in two years, the presidency in four, and the Senate in six. With control of those institutions, since it is a majority, it can adopt any constitutional amendments it wishes. Virtually all amendments have been adopted within three years. Thus, in about nine years, a determined majority could overturn everything. It could eliminate Congress, abolish the Supreme Court, even repeal the Bill of Rights."

"But Professor," Donovan broke in,

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"isn't that a bit extreme? Surely the good sense of the people . . ."

"Precisely, Mr. Donovan!" Kirkham responded, stabbing at him with an index finger. "Precisely! The good sense of the public would prevail before the situation got that far. But suppose it didn't take that long? Suppose the Constitution could be amended overnight by majority vote, expressed simply by pressing a button on one of Mr. Howard's black boxes?"

"Actually, they'd use a telephone . . ." Paul tried to explain.

Kirkham went on undaunted. He turned to Whitford and Schwartz.

"Don't your organizations claim to speak for the public?"

"The League certainly does," Whitford answered. "We speak for decent people everywhere, who are appalled at the inhuman conditions of our prisons, and at the prevailing ideas of retributive punishment instead of rehabilitation."

"I don't know where Whitford's people are hiding out," Schwartz growled, "but the Foundation represents all the common, ordinary people who are tired of seeing bleeding-heart judges turn hardened criminals loose to prey on us again, on all kinds of procedural pretexts."

"Yet both of you are opposed to this referendum, this chance for the people's voice to be heard? Isn't that so?"

Schwartz and Whitford turned to each other, troubled looks on their faces. After a long pause, Kirkham spoke again.

"Don't be afraid of the question, gentlemen. You are both perfectly correct. You fear that this referendum will not represent the true *vox populi,* but that of a passionate and temporary majority. Is that not true?"

Both answered affirmatively, although with some hesitation. Kirkham continued.

"Indeed, I dare say that each of you fears that an overly emotional and irrational public might support the position of the other instead of your own, umm, 'rational' position.

"This is precisely the point I've been trying to get across. The procedural delays in the Constitution are not technical problems to be solved by technical means. They are deliberate barriers against the passions of the moment. They can be overcome by a determined majority which pursues its aims consistently, and which can hold itself together for five to ten years. But they cannot be overcome by a merely temporary majority, passionate though it may be. Such a majority merely dashes itself against the breakwaters of the Constitution. A determined majority, like the tide, slowly but surely washes over those breakwaters. You, Mr. Howard, are attempting to remove those barriers, those breakwaters, and expose us to the continuous battering of the waves of momentary public passion."

Kirkham sat back and breathed deeply. Donovan moved into the breach, to prevent even a moment's dead air.

"You have stated your position very well, Professor. I can understand why you are so highly regarded among your peers. But Mr. Howard," and he turned to Paul, "I have another aspect of the issue I'd like to explore.

"The device which makes all this possible, the one which allows any or-

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dinary telephone to talk to a computer. That is your invention, isn't it?''

''I'm the co-inventor, with Terry Conway.''

Donovan dismissed the correction with a gesture. ''I wasn't concerned with the matter of legal title to the device. I meant, isn't this your brainchild? And isn't it the mainstay of your company?''

''It's the only device we currently manufacture, although we have plans . . .''

''Your plans are not important at the moment. Right now, you are dependent on that device. You must sell it, if your company is to survive. Isn't that your situation?''

''That's true of any company,'' Paul replied. ''If you don't sell what you make, you go out of business.''

''So your company is no different from others, then. How have sales been going?''

Paul thought he knew where this line of questioning was leading, and he didn't like it. But he had agreed to participate, and he couldn't afford to look as though he were dodging the issue.

''Sales have been growing slowly, Mr. Donovan. We're about on track with where we'd planned to be.''

''How were your sales doing before you announced the referendum?''

''We had just made a big sale to a motel chain.''

''That was your first big sale, wasn't it?''

''That's true,'' Paul admitted. ''Most of our sales before then had been smaller numbers of devices.''

''But in the week since your announcement, your sales have gone up dramatically, haven't they?''

''Yes, they have.''

''Well, now, if the recent spurt in sales puts you 'on track,' as you put it, you must have been doing more poorly than you planned before the announcement. Wasn't that the case?''

''I grant you the announcement preceded the spurt in sales,'' Paul replied in a tired voice. ''But we had been doing a lot of exhibiting at trade shows and so on, as well as contacting possible customers. Our efforts were just beginning to pay off. That motel sale was the first. We had been pursuing them for months. We had been going after the other customers as well, and we are now seeing the fruits of our selling efforts.''

''But the announcement didn't hurt your sales any, did it?''

''No, it didn't hurt. But you're trying to make it appear we made that announcement solely as a sales gimmick, to boost our sagging income. That's not so. Sales were already going up. We decided to go ahead with this referendum to demonstrate that the nation isn't using the technology we have available, to improve our political process.''

''Very well, then,'' Donovan asked, ''since you say the referendum is not part of your sales efforts, and now that you've heard everyone else here say they don't think you should go ahead with the referendum, are you going to drop the idea?''

''No, we're not. With all due respect to these distinguished gentlemen, I disagree with them. I think that my idea of what's good for the country is just as valid as theirs. I'm putting up my own money to advance my ideas, and

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I don't believe I have any obligation to stop just because they're upset. I really think we ought to take advantage of this technology, and I'm giving the country an opportunity to try it out."

"But you're going to undermine the Constitution . . ."

"You'll give all those bleeding hearts a chance to . . . "

"You're going to stir up the law-and-order types . . ."

"Please, gentlemen," Donovan cut in. "That's all the time we have. Thank you for your participation." He faced the camera squarely, as all the other microphones were shut off. "Ladies and gentlemen, this has been 'Face the Issues.' Tune in again next week when we bring you another . . ."

Paul finished the last of the sandwiches they'd had sent in, drained his cup of coffee, and threw the trash in his wastebasket. He looked at his watch and did a mental calculation. Just past six-thirty on the west coast. Less than an hour and the call-in period would be over.

He picked up the phone and called the guard at the plant gate.

"Murphy? Anything going on out there?"

"Not a thing," came the answer. "The protesters've gone home. This little April shower was too much for 'em."

"I'm glad nothing happened beyond a little picketing. How're the rent-a-cops?"

"Both of 'em are sittin' here slurpin' coffee like the Brazilians was goin' to quit growin' it. Sure and I was glad you hired 'em, though, when the protesters started showin' up."

"Let me know if anything happens." Paul hung up the phone.

He got up from his desk and stood next to Terry at the window to the computer room.

"How're we doing?"

"A lot better than I expected," Terry replied. "Only about one caller in ten thousand gets a busy signal. So we're keeping up pretty well."

"Are the people on the west coast calling in at the same rate as the easterners?"

"Pretty much so. Interest must be widespread there too."

The phone on Paul's desk rang. He walked over and picked it up.

"Howard here."

"This is Murphy. There's a man here says he's Professor Kirkham. Insists on seeing you."

Paul covered the mouthpiece and spoke to Terry. "Professor Kirkham is down at the gate and wants in."

"No reason to keep him standing in the rain, is there?"

"I guess not." He uncovered the mouthpiece. "Murphy, have one of the rent-a-cops escort him up here. You keep an eye on things down there."

A few minutes later Kirkham was ushered into the office by the guard from the detective agency. Kirkham hung up his raincoat, then rushed toward Paul.

"Mr. Howard, I had hoped to be here long before this, but my plane was delayed by the weather. Tell me, how is your demonstration going?"

"Not a bit of trouble, Professor," Paul said, and pointed through the window to the computer with its reels of

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tape winding and unwinding, and an occasional light blinking on or off.

"You understand, I trust, that I bear you no personal ill will," Kirkham said. "But I am sorry to learn that things are going well. I had hoped to dissuade you from going ahead with this demonstration, but failing that, I had hoped that a malfunction of your apparatus would stop you."

With a trace of malicious glee, Paul told him, "Well, we had a failure of one of our translators earlier in the evening, but we had anticipated that and had a spare ready. We switched it in without losing a single call." But the glee departed when he saw the look of disappointment on Kirkham's face. Paul had no desire to hurt anyone, especially someone as sincere as Kirkham.

"Even now," Kirkham implored, "could you not terminate the demonstration? Explain that you had a malfunction of your equipment and were not able to complete the demonstration? That would give constitutional scholars a chance to examine the full implications of what you are doing. That way some of the damage might be mitigated."

The pleading in Kirkham's eyes tore at Paul. He answered gently. "Professor, it would do no good at all if we were to fake a breakdown. There are hundreds of people in the world who understand this technology as well as we do. We just happened to get our patent application in first. They could buy our gadgets and try this same type of demonstration, even if we aborted this one. I'm afraid this particular genie is out of the bottle, and there's no way to get it back inside."

Kirkham looked as though Paul's words had taken the heart out of him. He found a chair and slumped into it.

"Have you eaten, Professor? We could have some more sandwiches sent in."

"Thank you, I haven't any appetite."

"Here, have some coffee, then."

Kirkham sipped at the coffee for a bit, and Paul spoke again. "Would you like to see what we're doing?"

Kirkham straightened up, but his eyes still seemed dull. "Yes," he said woodenly, "I may as well understand the nature of the evil which is befalling us."

"Very well. We are having people call a special number assigned by the phone company. We have a bank of lines receiving the calls. Each line goes to one of our translators, which converts dial pulses or telephone tones into computer code. The signal, a '1' or a '0,' is then sent to the computer as a vote, where it is tallied."

"I understand that, Mr. Howard, but how do you keep people from voting twice, and so on?"

"The phone company has set up their equipment to eliminate all credit card or pay-phone calls, and all calls from business phones. Only residence phones can be used to call in. Each residence can call only once. If a second call originates there, it receives nothing but a busy signal."

"Suppose a husband and wife at the same residence wish to vote differently?"

"Eventually we'll use something like Social Security numbers to identify individual voters. But working out a master list of valid numbers, while still preserving the voter's privacy, was

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more complication than we wanted to handle for this demonstration. So for now there's only one vote per telephone."

"Yes, how *do* you protect the voter's privacy? That will be an important question."

"Ultimately some form of encryption will be needed. But for the demonstration, we took advantage of the fact that the phone company's equipment doesn't deal with the content of a call, but only with the calling and called numbers. Without actually intercepting a call, there is no way the phone company can tell how anyone voted. Our equipment, on the other hand, deals only with the content of a call. We have no way of knowing the number from which the call came."

"It sounds as though you did provide reasonably well for privacy."

"Yes. However, we did make one arrangement with the phone company which will give us additional information while still not violating the voter's privacy. With each call, the phone company identifies the Census Tract where the call originates."

"Why did you ask for that information?"

"We thought social scientists would be interested in correlating votes with income, education, ethnic composition, and so on, just as they do when they examine ordinary elections precinct by precinct."

"Ah, yes, the spirit of scientific inquiry," Kirkham said, his voice full of bitterness. "I know physicists who would be manning their instruments on Judgment Day, trying to analyze the sound of the Last Trump. And I know social scientists who will be fatuously running their correlations and regressions while the Constitution is crashing down about their ears."

"Time's up!" Terry announced. "Half past seven on the west coast. If they haven't voted by now, it's too late."

"Good. We can switch off the translators and start the tallying."

"How long will that take?" Kirkham asked.

"Actually not long," Paul replied. "The tallying has been kept current on a running basis. But we haven't had the results printed out, since we couldn't see any point in it. The networks aren't following this the way they do elections. But it will take a couple of minutes for the computer to complete the cross-tabulation of votes by Census Tract, then start printing out. Shall we go inside the computer room and watch?"

Paul led the way to the door of the computer room, opened it, and ushered the other two through. Kirkham seemed to have sunk even more deeply into a mood of foreboding, as though Doomsday had been announced for the morrow. He walked in slowly, woodenly.

Paul closed the door, strode ahead of the other two, and stepped to the computer. He entered some commands through a terminal, then stepped back. For a long moment nothing happened. The lights on the computer continued to blink, as though it were silently muttering to itself. Then suddenly the printer started chattering. The three of them watched the printout stack up in the tray, inch by inch.

Kirkham slowly moved toward the printer, as though fascinated by the way the characters flowed onto the paper. He

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seemed to examine the printer carefully, first one side, then the other.

His hand darted inside his coat. He whipped out a small hatchet. He hacked at an armored cable on the side of the printer. The hatchet dented its sheathing.

"No, Professor! That's the power cable!"

He swung again. The blade bit through the sheathing. Blue flame arced briefly. He jerked his hand back and dropped the hatchet. The abrupt silence seemed louder than the printer's clatter. A cloud of smoke reeking of burned insulation climbed toward the ceiling, where the air conditioning fans sucked it out.

Paul and Terry pinned Kirkham's arms to his sides. He fought their grip briefly, then relaxed.

"No need to hold me, gentlemen," he said in a tired voice. "I have no more weapons."

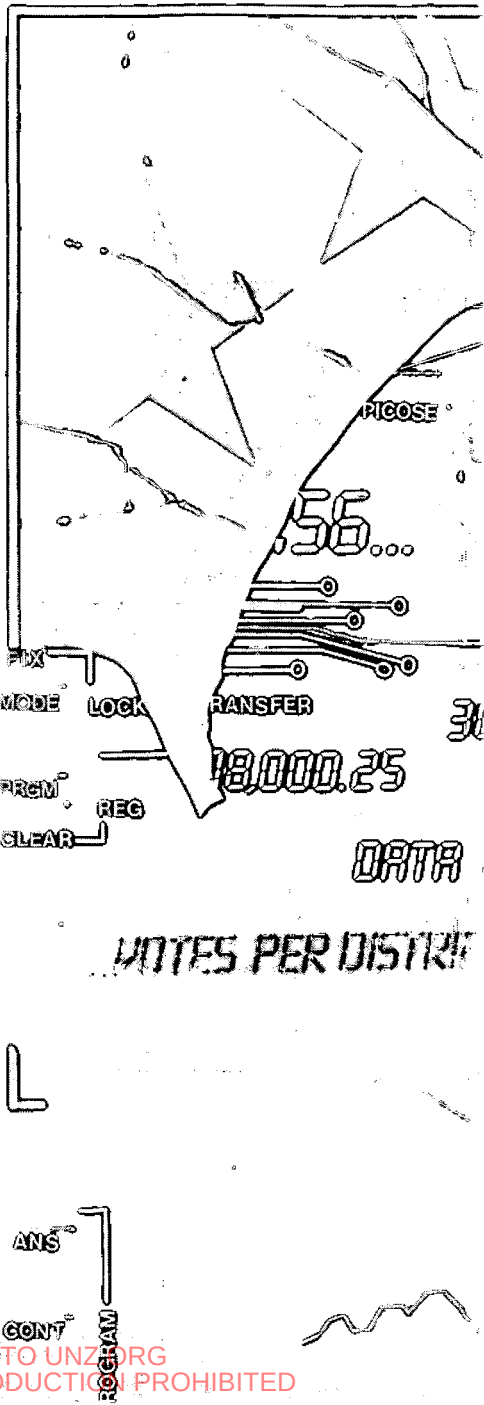
Paul picked up the hatchet and examined the blade, where the arc had burned a half-moon chunk out of the cutting edge. "I'll hang onto this thing just to make sure," he said, his voice grim.

He stepped to the printer and looked it over. "Seems to be okay, except the power cable's been cut. Wonder if we can get a repairman at this hour?"

"What irony," Kirkham said. "This technology of yours is going to destroy everything I value, and I don't even understand it well enough to find a vital spot at which to strike."

Suddenly the room lights blinked. Paul and Terry glanced at each other.

"Another attempt to damage our computer?" Paul asked.



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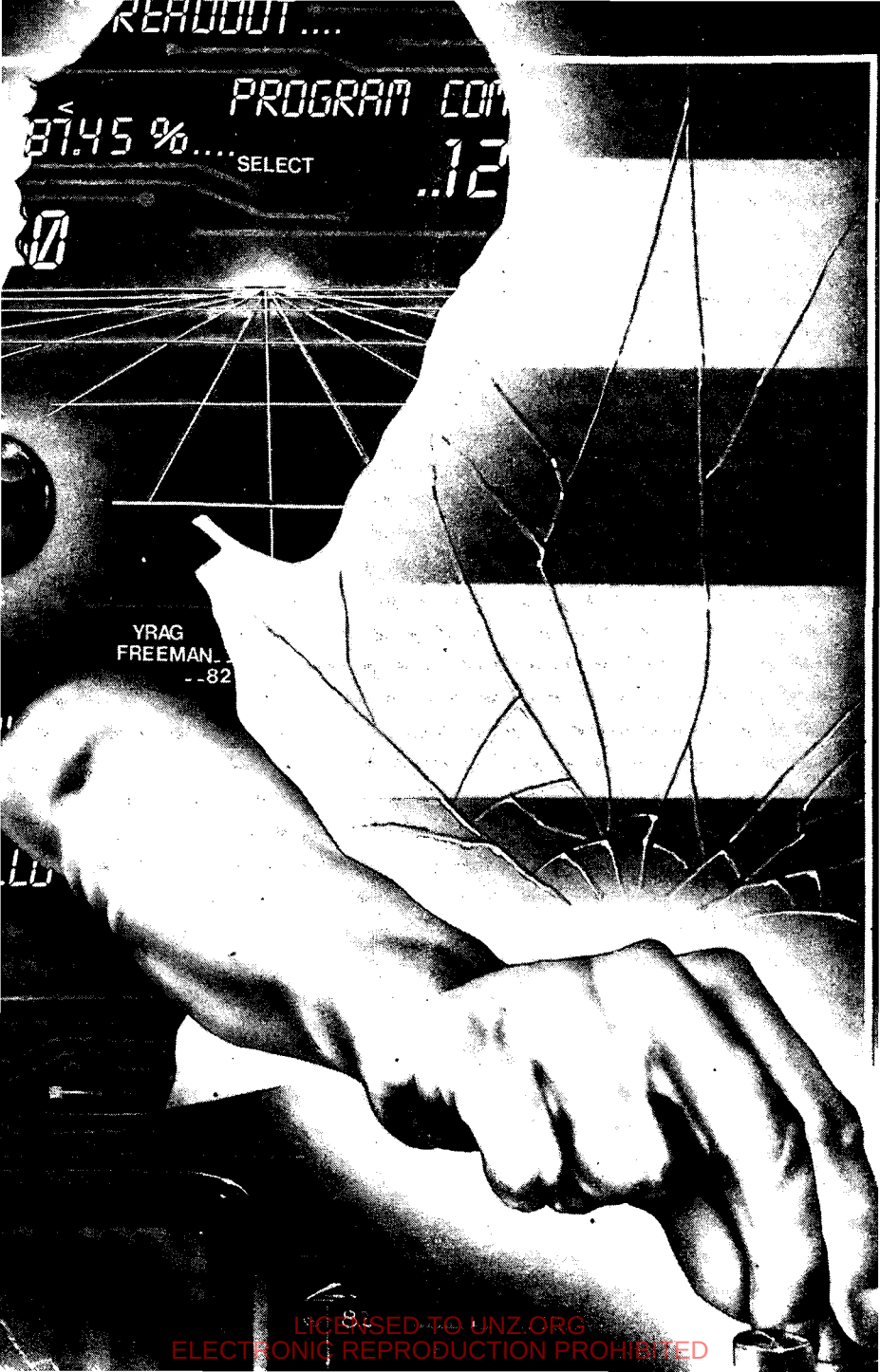

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Before Terry could answer, there was a rolling crash of thunder outside.

"Lightning must have hit the power line. Evidently our April showers are getting a bit noisy."

"Good. I guess I'm getting a bit nervous. If a rational person like Professor Kirkham can be driven to violence, no telling what some others might do."

Paul followed Kirkham out of the computer room and seated him in a corner chair. Terry stood over Kirkham while Paul got on the phone. First he asked Murphy to send up one of the hired guards. Then he called the computer company.

"They say they'll have a repairman here in half an hour," he said as he replaced the phone in its cradle. He then pulled a chair up in front of Kirkham and seated himself.

"Professor, I'm baffled by what you've done. I would have thought you'd want to see how people voted on this issue."

"Mr. Howard, I do admit to some professional curiosity about how people voted. But the actual outcome of the vote is irrelevant. From my standpoint, the most important fact is that you have been able to carry out an electronic referendum. I think that has enormous significance. It's going to change our whole society."

Paul's face twisted into a one-sided smile. "That's fantastic, Professor. Most people were so caught up on one side or the other of the capital punishment issue they couldn't see the significance of what I'm doing. You were one of the few who did see it. And all you could think of to do was smash the machine with which I'm doing it. Just like any modern-day Luddite. Look! I've done something worthwhile. I've done something important. I've made it possible for us to bypass all the slow-moving machinery of representative government!"

"Indeed you have." The tiredness in Kirkham's voice couldn't mask the bitterness of the words. "That is just what you have done."

The phone rang, just as the hired guard entered the room. Paul pointed at Kirkham and said to the guard, "Keep an eye on him." Then he picked up the phone.

There was the hiss of a long-distance connection, then a voice.

"Mr. Howard, this is Archibald Morgan. Please hold for Governor Wilkinson."

Paul covered the mouthpiece. "It's the governor. How do you address a governor? 'Your Excellency'? 'Your Honor'?"

Kirkham answered in a tired voice. "Just call him 'Governor.'"

Then a voice came on the phone. "Mr. Howard? This is Governor Wilkinson."

"Yes, Governor, what can I do for you?"

"You haven't released the outcome of your referendum to the press yet. Could you let me have a preliminary count of your results?"

"I'm sorry, Governor, but we don't have any results yet. We, ah, we had a minor mishap with our printer. The company is sending a repairman out, and we should have it fixed in an hour or so. None of the data was lost, but we can't print it out. I'll be glad to let you

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have the results as soon as we release them to the press."

"That will be fine. I appreciate that, Mr. Howard. But can you tell me how many people voted in our state?"

"Only approximately. But I did note the figure when voting ended here." He gave the number.

"Ummm . . ." was the only response. Then a long silence. Finally the governor spoke again. "That's over half the registered voters in the state, isn't it?"

"I don't happen to have that figure, Governor. I don't know."

"Well, I do happen to know. That is over half." Then he paused.

I'll just bet you know, Paul thought to himself. Then the governor came on again.

"Now listen, Mr. Howard. I fully appreciate the significance of what you've done, regardless of how this particular referendum comes out. I want you to know that I'm going to make the electronic referendum the centerpiece of my campaign for re-election. When I'm re-elected, I'm going to propose a series of amendments to the State Constitution to replace a lot of our antiquated procedures with electronic voting. Your ideas represent the wave of the future, Mr. Howard, and I'm going to push them vigorously."

"I'm pleased to hear that, Governor Wilkinson."

"I thought you would be. Now be sure to let me know as soon as you have your results printed out."

The conversation ended, Paul hung up the phone and relayed the news to Terry and Professor Kirkham.

"That's great!" Terry responded. Kirkham's low comment was drowned by a roll of thunder and a gust of wind outside.

As the storm noises died, Kirkham spoke. "What was that?"

"What was what, Professor?"

"I heard something. Out there in the night. A sound like something fragile, being shattered."

"All I heard was the thunder," Paul replied.

"Same here," came from Terry.

"Not thunder. There was some other noise," Kirkham insisted.

"I heard it too," the guard said. "Sounded like glass breaking."

"Maybe the wind drove a branch against a window. That gust was pretty strong," Terry said.

"That must be what it was," Paul added. "What else could it have been?"

"Of course," Kirkham responded. "It must have been that. Constitutions don't make any sound when they're destroyed." ■

● How wonderfully we stand upon this world. Here it is we are born, bred, and live, and yet we view these things with an almost entire absence of wonder to ourselves respecting the way in which all this happens.

Michael Faraday

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the reference library

By Tom Easton

Mindkiller, S. Robinson, Holt, Rinehart and Winston, $14.50, 278 pp.
The Void Captain's Tale, N. Spinrad, Timescape, $13.95, ? pp.
Godstalk, P. C. Hodgell, Atheneum (Argo), $13.95, 271 pp.
Earthchild, S. Webb, Atheneum (Argo), $11.95, 192 pp.
The Harp and the Blade, J. M. Myers, Donning, $5.95, 223 pp.
Ancient Lights, D. Grubb, Viking, $10.95, 540 pp.
Critical Encounters II: Writers and Themes in Science Fiction, T. Staicar, ed., Ungar, $6.95, 166 pp.
The Feminine Eye: Science Fiction and the Women Who Write It, T. Staicar, ed., Ungar, $6.95, 148 pp.
Psion, J.D. Vinge, Delacorte, $12.95, 346 pp.
Carnifex Mardi Gras, J.F. Carr, Pequod, $12.00, 218 pp.
The Beast, R. Stallman, Timescape, $2.50, 192 pp.
The Fantastic Saint, L. Charteris (M.H. Greenberg and C.G. Waugh, eds), Doubleday, $11.95, 180 pp.
Laughing Space, I. Asimov and J.O. Jeppson, Houghton Mifflin, $17.95, 521 pp.

Another month, another column. Ho. And not so hum. I *do* enjoy this little chore. Especially when, as you will shortly read, Spider has a new novel out, and I can praise it to the skies. There are a few other good ones, too, and one or two not so good. I'll let you know which when I get to them.

For now, let me say that since our last chat I've signed the contract to do a second edition of my biology textbook. An editor has called to ask for a proposal, spurred by a talk with Stan Schmidt (Thanks, Stan!) and by a piece in *Omni*'s crackpot section on an idea of mine about genetically engineered cars (*Omni* picked it up from the *National Enquirer*, who got it from *Road Test*). Ideas travel, folks, and stories breed. I never thought the *Enquirer*'s attentions might lead to a book contract, but mebbeso, mebbeso. I'll let you know.

And so to books. Spider first. The novel is **Mindkiller**. It's marvelous. It incorporates his short story, "God is an Iron," from *Omni*, and extends the metaphor very effectively. And Spider's insane sense of humor rears its obscene head again (don't worry—he leaves the puns in their cage).

Spider opens with a Halifax college professor who is about to leap from bridge to bay. He is depressed, for his wife has left him. But at the last moment he is saved by a mugger who— surprise—wants to mug him. Mugger foiled, the prof decides to live after all. He goes home, finds his sister—unseen for years—in his apartment, and promptly loses her. She disappears on the way home from a party. Mystery.

Chapter 2 leaps ahead five years to show us "God is an Iron," in which a burglar saves a girl from starving happily, with a wire in her pleasure center. The burglar remembers no past. Another mystery.

Chapter 3 returns to Halifax. The prof is in bed with a student's mother. They are playing fantasy games with each other: she is tied to the bed. Events have

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reached a pinnacle of . . . and the ex-wife shows up, followed by a horde of reporters and TV cameras, there to publicize the sister's disappearance. Someone finds the bedroom. Exit lover, in huff. Exeunt readers, in convulsions.

Even Spider would find it difficult to keep that up. I'm just as glad he doesn't, for I don't need that kind of excruciation. You too will probably be happy to see him get down to straight story, leaping from 1994 to 1999, weaving plot lines, showing two approaches to mystery, and eventually revealing a link between the two protagonists that surprises less than Spider may have intended. The post-link ending ties things together very nicely. The technology that now lets us make an animal starve itself to death, ignoring food in favor of electric shocks to its pleasure center, and theoretically lets us do the same to people, may in fact develop in the direction Spider projects. I don't think the development will be quite as swift or as simple as he says in the novel, but that is a quibble, since Spider may be guilty of nothing worse than dramatic license. Eventually, we may really be able to remove and implant memories at will, and then we *will* face the issue of controlling the technology. I don't think—again I quibble—that the eventual control will be any one-man show. More likely, it will be another government bureaucracy, as heartless, ruthless, and bumbling as the CIA, FDA, or KGB; I'd rather it turned out Spider's way.

Ignore my quibbles. Have I been nebulous enough not to give too much away? I hope so. So buy the book already! You won't very often find more satisfaction between two covers.

Norman Spinrad has done some remarkable work by any standard. Much of it has been risky experimentation of one form or another, and some of it, such as **The Iron Dream,** has succeeded admirably, at least in its own terms. Sometimes he fails, though not for lack of ambition.

I have one of those failures here. It's *The Void Captain's Tale*, and it is by no means all bad. In fact, it has enough good in it that many people will rave over it when it is published in January. The story focuses on the Pilot and Captain of a starship. Normally the two never deal with each other. Captains are aloof, playing a role in the microcosmic dynamics of an isolated, decadent salon for passengers and occasionally pushing the Jump button to leap the light years. Pilots are faceless blobs, social isolates, incapable of normal orgasm. The Jump button activates circuitry which, by inducing in the Pilot an eternal instant of orgasm, transports ship and contents. This equation of orgasm with transport is but one of Spinrad's nifties. Another is his use of the necessarily sexual relationship between Pilot and Captain, for it becomes overt when his Pilot and Captain meet each other. They scandalize, they conspire, and in doing so they invite either disaster or apotheosis. The book is a metaphor. It is literature. It will live forever!

The flaw is in the style. Spinrad has given his characters a roundness of phrasing, a fulsomeness, that makes them all sound as if they are on the verge of throwing up. Actually this tone suits his story's world, one of decadent self indulgence. More serious is his attempt to portray a future evolution of language by absorption into English of words and phrases from many tongues (largely the familiar ones of German, French, Spanish, and Latin). The trouble is that foreign words often—if not usually—creep into a language to express the inexpres-

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sible. Spinrad violates his own intent by using the foreignisms largely as asides, as nonessentials, as in "und so weiter," and so on. For example, see the hero's confession of "a certain secret pride in having chosen the vision absolute over the quotidian vie humaine." On the few occasions when an alien word is not likely to be known to a modern, it is usually clear in context. Unfortunately, the effect is fulsome; it reminds of antique bad writing, sprinkled with pretentious displays of false erudition. It fails to feel futuristic, and it does a lot to spoil the tale for me.

Will it do the same for you? Maybe. Maybe not. The answer depends on how much you dislike the antique style Spinrad reminds me of and on how much you focus on plot instead of style. You may be more willing to forgive the style, for Spinrad presumably limited his linguistic invention in the name of making his prose accessible to modern readers. You may love the book, for there is much in it to love.

P.C. Hodgell's **God Stalk** is a promising first novel, a fantasy owing more to Leiber and his ilk than to Tolkien. The heroine is Jame of the Kencyr, one of a triplet of races dedicated to the Three-Faced God and its battle against the evil Perimal Darkling. The three races have spent 30,000 years fleeing world after world to escape the Darkling. They have been on Rathillien for 3,000 years, losing strength, and now the Darkling encroaches again. At the borders of light and darkness, in the Haunted Lands, sits one Kencyr keep. Overrun, it is in ruins when Jame returns from exile. She flees to the strange city of Tai-tastigon, a bastion of many gods, seeking her brother, who may have survived his keep's fall. There she is adopted by a charming inn, joins the Thieves' Guild, explores the nature of gods (resurrecting one), and prepares to resume her kin-search. Future volumes will continue the story.

The book is rich with wit and incident. Jame is deft, bright, a dancer, and superbly confident in herself. She almost lives. If she does not, it is because her life in Tai-tastigon is not fully revealed. Hodgell concentrates on the inn, giving Jame's training by a master thief and her escapades among the city's temples relatively short shrift. We see only one side of her, a very human side. We miss other human sides, and we develop no real feel for her role as an avatar of her god. What is missing? Balance, for one thing. Vigor, for another, for though Hodgell tells a vigorous tale, it feels like the shadow of a reality, neither portrait nor reflection. Still, the book is worth a read, and I look forward to the next in the series.

Sharon Webb's **Earthchild** displays the effects of immortality. The process was developed in secret and then put in the world's food and water, still in secret. Once it had worked, the world government announced what it had done. Result? Jealousy. The process works only on kids. Once this is known, adults begin slaughtering children, and to ensure any future at all, the government moves all the kids into special camps. There they grow, are educated, and mature. In time, a select few are chosen to be the future's immortal government.

The story's protagonist is Kurt, a teenage musician. He survives murder attempts, becomes the world's Minister of Culture, and realizes that immortality has cost humanity all its creative spirit. The race against death was the motive behind art and science. If nothing is done, the future will be immortal but stagnant.

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Webb's theme is hardly original, but she handles it well, perhaps best in her solution to the problem. I won't describe it. Discover it for yourself, for it lets Webb close her tale on a perfect note of finiteness. She is an artist herself, if perhaps too keenly aware of her mortality. Somehow, I don't feel death is so essential to creativity, or freedom from death such an invitation to let art slide. Certainly there are plenty of mortal procrastinators.

A few years ago, John Myers Myers gave us *Silverlock*, a literary *roman à clef*. Now it's **The Harp and the Blade**, a fantasy of Dark Age Europe. The bard Finnian fails to save a youth from murder by a local chieftain. Later a druid wizard, whom he meets atop a dolmen, curses him to "aid any man or woman in need of help." The wizard clearly has the power to back his curse; a Pictish-looking fellow, he claims to be the title character of "I was born ten thousand years ago."

At any rate, the curse fixes Finnian's wagon good. Not long after, he meets Conan (maybe even *the* Conan) and helps him escape pursuit, fight, and forge a kingdom. The mood is bright, even gay, and wry. Myers's yarn is a pleasure.

Davis Grubb died six weeks after finishing **Ancient Lights**, a massive novel of the umpteenth coming. Pun intended. The book opens in the voice of Fifi Leech, a comely, raunchy, horny maiden (whose cousin Davis Grubb is "late"). She is a joyful, loving, multisexual bedhopper, and the daughter of holy man Sweeley Leech. The plot begins as they commit an "unrobbery," pumping millions into a bank's accounts with the aid of the fairies. Thus disencumbered of wealth, Sweeley can write the book he has been trying to remember through 2,000 years of reincarnation, the Criste Lite, a concept Grubb seems to blame with its trimmings on William Blake.

When Sweeley succeeds, producing a legal pad of glorious runes, daughter Lindy runs off with the pad to New York. She will restore Papa's fortunes, she swears, by submitting the manuscript to the Nobel Prize computer, which will pulp the manuscript, spit out bound copies, and confer fame, wealth, and the curse of organization on the new Messiah. However, the Criste Lite burns out the computer even as it is being pulped and only blank copies emerge; the Lite is lost. The government (Big Business, for real) declares giving money away a capital crime. Sweeley and Feef start seeking the Criste Lite all over again. Government agents and terrorists pursue them. Und so weiter, as Spinrad might say.

It's quite a brew. It's heady, too. It's a glandular mandular (sorry!), a sermon that God is first and foremost Love and Joy, a diatribe against organized religion and government and agelasts (folks who cannot laugh). It's a horror novel turned inside out—sort of—with not nasty but nice surprises round every corner. And at times it's downright Rabelaisian—see the discourse on farts on p. 295.

Yet . . . yet . . . Grubb seems to have known he was dying. Perhaps he rushed. I would. So might Sharon Webb. As a result, the antic pace of the opening chapters flags (could we stand 500 pages of it?). The plot becomes dilute digressive, wandering. Threads tangle, and the one suspending our disbelief frays. The end stumbles. The book is better than most writers can hope to write in all their lives, but still . . . Buy it. You *will* enjoy it. And there'll be no more from the cask.

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Last month I mentioned Ungar's series of critical volumes. I have two more in the series now, both edited by Tom Staicar, the series overseer. One is **Critical Encounters II: Writers and Themes in SF**. It offers discussions of Matheson, Piserchia, Watson, Clement, Zelazny, Silverberg, the Strugatskys, and McIntyre. The other is **The Feminine Eye: SF and the Women Who Write It**, covering Brackett, Moore, Norton, Cherryh, Tiptree, Charnas, Bradley, Elgin, and Vinge. Most of the essays fail to impress me greatly in breadth, depth, coverage, or scholarship. Insights are limited, and the writers seem content to play the sorts of games English profs demand of their students. There are exceptions. Two are the essays on Roger Zelazny and Joan Vinge, both by Carl Yoke. He plays the games too, but his comments on Zelazny's use of mythologies resonate well with *Eye of Cat*, reviewed last month, and his remarks on Vinge's alienated protagonists are confirmed by her latest novel, *Psion*.

Psion's protagonist is Cat, an orphan, who lives however he can in the gutters of a far-future world. When a slave-hunting press gang finds him, he fights and flees, only to be arrested. He expects to be turned over immediately to the press gang, for that is the way his world works, but instead he is offered an out. He may join a mysterious research project.

He joins. The project is for psi-talented people, or psions. It is run by Siebeling, who (it later seems) may or may not be Cat's lost father. Vinge never says, although she does get good mileage out of a neat Oedipal triangle among Cat, Siebeling, and Jule, a woman research subject each loves in his way.

The project's ostensible aim is to train psions. It succeeds in this, awakening Cat's powers, but it has another purpose as well. The psions-in-training are bait for an arch-villain psion. When he takes the bait, the plot begins to move, and Cat matures quickly, much as Yoke describes in his essay. Understandably enough, Cat begins by feeling alienated, estranged, as both psion and orphan. He wants to belong, but he equates any sense of belonging with being used, and he fights his own desires. His maturation comes with acceptance of the desire and a lessening of his alienation—and, as Yoke notes in other Vinge works, there is descent into and return from the underworld on the way. For Vinge, the cure for alienation seems to involve at least a figurative death and rebirth.

Is there a flaw in *Psion*? (Isn't there always?) The one that struck me as I read is that Cat is supposed to be illiterate, but though he speaks appropriately, his thoughts are too complex, polished, and sophisticated. He does not feel illiterate, and this spoiled a bit my suspension of disbelief.

John F. Carr's **Carnifex Mardi Gras** is grim Goulart, flashily inventive but depressingly bloody-minded. Its world is a 21st century of vast wealth, huge population, and homeless children. The family is finally dead, and with it has died morality. Anything goes.

Carr gives us what amounts to four novelettes (two have appeared elsewhere) which track the efforts of a documentary film-maker to regain his fame. In the first, "The Masque of the Blue Clown," Roald Vallen penetrates a private enclave to expose the residents' reasons for secrecy, which turn out to involve ritual murder in the Crying Clown Rites. The second, "The Crying Clown Rites," focuses on a youth who is adopted into the enclave at a later

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date; much incident repeats "Blue Clown," even to the wording; I felt cheated. Number three, "The Dance of the Dwarfs," gives an insulting talk-show host ("guest pest") his due. The fourth, "Siren's Song," shows us that Vallen has succeeded in his quest and lets us glimpse a miracle worker who may be the Third Jesus.

The book is no novel. It is too fragmented for that. But it does display the world in which Carr's and Camden Benare's eight-volume *The Crying Clown Celebration* will be set. Volume one of the eight, *The First Book of Philip*, will appear from Pequod later this year (1982). I'll look at it when I get a copy, but I can't say I'm expecting marvels. I *hope* it will be less bloody, cruel, and bizarre. I *hope* the pieces will be joined with less obvious seams. I *hope* Carr will cheer up.

I finally have a copy of Stallman's **The Beast** (and, dammit, it's still not right—every page in the last chapter is missing its top quarter!). As promised, here's my addendum to the Timescape PR sheet: The book is not quite what the PR says it is (surprise!). There are two beasts now, but in the end they do not really "transcend the plane of human reality." Mated, they become capable of leaping into space. *That's* the direction of the future I hoped Stallman would show us when I reviewed *The Captive*.

Are there other answers? If you've read *The Orphan* and *The Captive*, you've wondered how the beast can summon up a human persona to don at need. Somehow, let me tell you, it calls up someone who has recently died; the "other side" of the veil is a real place. By giving this someone more life —though without memory of his or her past life—the beast might seem to be conferring a blessing. However, how must that person react on learning that the beast is leaving and he or she must return to death? Each beast has the power to return from death one person or persona of the several it has worn, or even another one entirely. Who will that person be? Stallman's answer is poignant.

Back in November, I reviewed Leslie Charteris's classic Saint novel, *The Last Hero*. I haven't seen any more Saint titles from Ace Charter, but there *is* now a collection of all Saint short stories that fit the science fiction and fantasy genre. It's **The Fantastic Saint**, edited by Martin Greenberg and Charles Waugh and with an afterword by Charteris himself (dated 1980, so he may still be around).

The stories involve a man who could make gold (1932), a helicopter that rose straight up when it shouldn't (1933), giant ants (1937), voodoo (1954), solipsism (1948), and the Loch Ness Monster (1959). They're vintage stuff. Don't miss.

Isaac Asimov and his psychiatrist, J.O. Jeppson (the missus, really) have bottled another vintage, and a delightful one, in **Laughing Space**. It's an anthology of humorous SF stories, poems, and cartoons.

You know those *big* boxes of chocolates? The ones with two layers? With creams, jellies, nuts, nougats, caramels, etc.? Even with a few you can't stand?

Here is the literary equivalent. Enjoy. It's not fattening. ■

● When you don't have an education, you've got to use your brains. Anonymous

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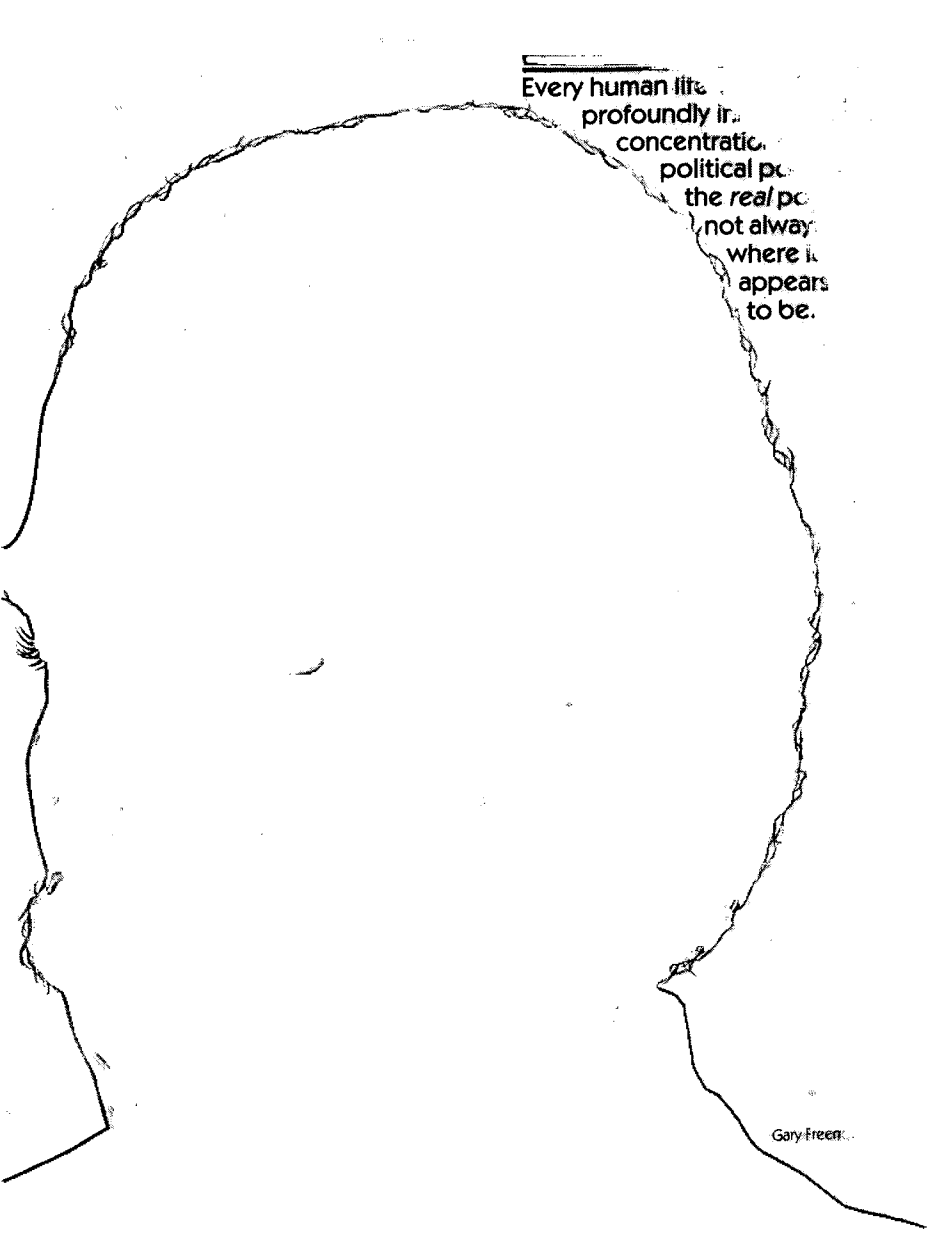

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Jeremy Keating hated the rain. Athens was a dismal enough assignment, but in the windswept rainy night it was cold and black and dangerous. Everyone pictures Athens in the sunshine, he thought. The Acropolis, the gleaming ancient temples. They don't see the filthy modern city with its endless streams of automobiles spewing out so much pollution that the marble statues are being eaten away and the ancient monuments are in danger of crumbling.

Huddled inside his trench coat, Keating stood in the shadows of a deep doorway across the street from the taverna where his target was eating a relaxed and leisurely dinner. His last, if things went the way Keating planned.

He stood as far back in the doorway as he could, pressed against the cold stones of the building, both to remain unseen in the shadows and to keep the cold rain off himself. Rain or no, the automobile traffic still clogged Filellinon Boulevard, cars inching by bumper to bumper, honking their horns, squealing on the slickened paving. The worst traffic in the world, night and day. A million and a half Greeks, all in cars, all the time. They drove the way they lived—argumentatively.

The man dining across the boulevard in the warm, brightly lit taverna was Kabete Rungawa, of the Tanzanian delegation to the World Government conference. "The Black Saint of the Third World," he was called. The most revered man since Gandhi. Keating smiled grimly to himself. According to his acquaintances in the Vatican, a man has to be dead before he can be proclaimed a saint.

Keating was a tall man, an inch over six feet. He had the lean graceful body of a trained athlete, and it had taken him years of constant painful work to acquire it. The earlier part of his adult life he had spent behind a desk or at embassy parties, like so many other Foreign Service career officers. But that had been a lifetime ago, when he was a minor cog in the Department of State's global machine. When he was a husband and father.

His wife had been killed in the rioting in Tunis, part of the carefully orchestrated Third World upheaval that had forced the new World Government down the throats of the white, industrialized nations. His son had died of typhus in the besieged embassy, when they were unable to get medical supplies because the U.S. government could not decide whether it should negotiate with the radicals or send in the Marines.

In the end, they negotiated. But by then it was too late. So now Keating served as a roving attaché to U.S. embassies or consulates, serving where his special talents were needed. He had found those talents in the depth of his agony, his despair, his hatred.

Outwardly he was still a minor diplomatic functionary, an interesting dinner companion, a quietly handsome man with brooding eyes who seemed both unattached and unavailable. That made him a magnetic lure for a certain type of woman, a challenge they could not resist. A few of them had gotten close enough to him to trace the hairline scar across his abdomen, all that remained of the surgery he had needed after his first assignment, in Indonesia. After that particular horror, he had never been surprised or injured again.

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With an adamant shake of his head, Keating forced himself to concentrate on the job at hand. The damp cold was seeping into him. His feet were already soaked. The cars still crawled along the rainy boulevard, honking impatiently. The noise was making him irritable, jumpy.

"Terminate with extreme prejudice," his boss had told him, that sunny afternoon in Virginia. "Do you understand what that means?"

Sitting in the deep leather chair in front of the section chief's broad walnut desk, Keating had nodded. "I may be new to this part of the department, but I've been around. It means to do to Rungawa what the Indonesians tried to do to me."

No one ever used the words *kill* or *assassinate* in these cheerfully lit offices. The men behind the desks, in their pinstripe suits, dealt with computer printouts and satellite photographs and euphemisms. Messy, frightening things like blood were never mentioned here.

The section chief steepled his fingers and gave Keating a long, thoughtful stare. He was a distinguished-looking man with silver hair and smoothly tanned skin. He might be the board chairman you meet at the country club, or the type of well-bred gentry who spends the summer racing yachts.

"Any questions, Jeremy?"

Keating shifted slightly in his chair. "Why Rungawa?"

The section chief made a little smile. "Do you like having the World Government order us around, demand that we disband our armed forces, tax us until we're as poor as the Third World?"

Keating felt the emotions burst into flame inside his guts. All the pain of his wife's death, of his son's lingering agony, of his hatred for the gloating ignorant sadistic petty tyrants who had killed them—all erupted in a volcanic tide of lava within him. But he clamped down on his bodily responses, used every ounce of training and willpower at his command to force his voice to remain calm. One thing he had learned about this organization, and about this section chief in particular: never let anyone know where you are vulnerable.

"I've got no great admiration for the World Government," he said.

The section chief's basilisk smile vanished. There was no need to appear friendly to this man. He was an employee, a tool. Despite his attempt to hide his emotions, it was obvious that all Keating lived for was to avenge his wife and child. It would get him killed, eventually, but for now his thirst for vengeance was a valuable handle for manipulating the man.

"Rungawa is the key to everything," the section chief said, leaning back in his tall swivel chair and rocking slightly.

Keating knew that the World Government, still less than five years old, was meeting in Athens to plan a global economic program. Rungawa would head the Tanzanian delegation.

"The World Government is taking special pains to destroy the United States," the section chief said, as calmly as he might announce a tennis score. "Washington was forced to accept the World Government, and the people went along with the idea because they thought it would put an end to the threat of nuclear war. Well, it's done that—at the cost of taxing our economy for every

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unemployed black, brown, and yellow man, woman, and child in the entire world."

"And Rungawa?" Keating repeated.

The section chief leaned forward, palms pressed on his desktop, and lowered his voice. "We can't back out of the World Government, for any number of reasons. But we can—with the aid of certain other Western nations—we can take control of it, if we're able to break up the solid voting bloc of the Third World nations."

"Would the Soviets . . ."

"We can make an accommodation with the Soviets," the section chief said impatiently, waving one hand in the air. "Nobody wants to go back to the old Cold War confrontations. It's the Third World that's got to be brought to terms."

"By eliminating Rungawa."

"Exactly! He's the glue that holds their bloc together. 'The Black Saint.' They practically worship him. Eliminate him and they'll fall back into their old tangle of bickering selfish politicians, just as OPEC broke up once the oil glut started."

It had all seemed so simple back there in that comfortable sunny office. Terminate Rungawa and then set about taking the leadership of the World Government. Fix up the damage done by the Third World's jealous greed. Get the world's economy back on the right track again.

But here in the rainy black night of Athens, Keating knew it was not that simple at all. His left hand gripped the dart gun in his trench coat pocket. There was enough poison in each dart to kill a man instantly and leave no trace for a coronor to find. The darts themselves dissolved on contact with the air within three minutes. The perfect murder weapon.

Squinting through the rain, Keating saw through the taverna's big plate glass window that Rungawa was getting up from his table, preparing to leave the restaurant.

Terminate Rungawa. That was his mission. Kill him and make it look as if he's had a heart attack. It should be easy enough. One old man, walking alone down the boulevard to his hotel. "The Black Saint" never used bodyguards. He was old enough for a heart attack to be beyond suspicion.

But it was not going to be that easy, Keating saw. Rungawa came out of the taverna accompanied by three younger men. And he did not turn toward his hotel. Instead, he started walking down the boulevard in the opposite direction, toward the narrow tangled streets of the most ancient part of the city, toward the Acropolis. In the rain. Walking.

Frowning with puzzlement and aggravation, Keating stepped out of the doorway and into the pelting rain. It was icy cold. He pulled up his collar and tugged his hat down lower. He hated the rain. Maybe the old bastard will catch pneumonia and die naturally, he thought angrily.

As he started across the boulevard a car splashed by, horn bleating, soaking his trousers. Keating jumped back just in time to avoid being hit. The driver's furious face, framed by the rain-streaked car window, glared at him as the auto swept past. Swearing methodically under his breath, Keating found another break in the traffic and sprinted across the boulevard, trying to avoid the pud-

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dles even though his feet were already wet through.

He stayed well behind Rungawa and his three companions, glad that they were walking instead of driving, miserable to be out in the chilling rain. As far as he could tell, all three of Rungawa's companions were black, young enough and big enough to be bodyguards. That complicated matters. Had someone warned Rungawa? Was there a leak in the department's operation?

With Keating trailing behind, the old man threaded the ancient winding streets that huddled around the jutting rock of the Acropolis. The four blacks walked around the ancient citadel, striding purposefully, as if they had to be at an exact place at a precise time. Keating had to stay well behind them because the traffic along Theonas Avenue was much thinner, and pedestrians, in this rain, were nowhere in sight except for his quarry. It was quieter here, along the shoulder of the great cliff. The usual nightly *son et lumière* show had been cancelled because of the rain; even the floodlights around the Parthenon and the other temples had been turned off.

For a few minutes Keating wondered if Rungawa was going to the Agora instead, but no, the old man and his friends turned in at the gate to the Acropolis. The Sacred Way of the ancient Athenians.

It was difficult to see through the rain, especially at this distance. Crouching low behind shrubbery, Keating fumbled in his trench coat pockets until he found the miniature "camera" he had brought with him. Among other things, it was an infrared snooperscope. Even in the darkness and rain, he could see the four men as they stopped at the main gate. Their figures looked ghostly gray and eerie against a flickering dark background.

They stopped for a few moments while one of them opened the gate that was usually locked and guarded. Keating was more impressed than surprised. They had access to everything they wanted. But why do they want to go up to the Parthenon on a rainy wintry night? And how can I make Rungawa's death look natural if I have to fight my way past three bodyguards?

The second question resolved itself almost as soon as Keating asked it. Rungawa left his companions at the gate and started up the steep, rain-slickened marble stairs by himself.

"A man that age, in this weather, could have a heart attack just from climbing those stairs," Keating whispered to himself. But he knew that he could not rely on chance.

He had never liked climbing. Although he felt completely safe and comfortable in a jet plane and had even made parachute jumps calmly, climbing up the slippery rock face of the cliff was something that Keating dreaded. But he did it, nevertheless. It was not as difficult as he had feared. Others had scaled the Acropolis, over the thirty-some centuries since the Greeks had first arrived at it. Keating clambered and scrambled over the rocks, crawling at first on all fours while the cold rain spattered in his face. Then he found a narrow trail. It was steep and slippery, but his soft-soled shoes, required for stealth, gripped the rock well enough.

He reached the top of the flat-surfaced cliff in a broad open area. To his right

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was the Propylaea and the little temple of Athene Nike. To his left, the Arechtheum, with its Caryatides patiently holding up the roof as they had for twenty-five hundred years; the marble Maidens stared blindly at Keating. He glanced at them, then looked across the width of the clifftop to the half-ruined Parthenon, the most beautiful building on Earth, a monument both to man's creative genius and his destructive folly.

The rain had slackened, but the night was still as dark as the deepest pit of hell. Keating brought the snooperscope to his eyes again and scanned from left to right.

And there stood Rungawa! Directly in front of the Parthenon, standing there with his arms upraised, as if praying.

Too far away for the dart gun, Keating knew. For some reason, his hands started to shake. Slowly, struggling for absolute self-control, Keating put the "camera" back into his trench coat and took out the pistol. He rose to his feet and began walking toward Rungawa with swift but unhurried, measured strides.

The old man's back was to him. All you have to do, Keating told himself, is get to within a few feet, pop the dart into his neck, and then wait a couple of minutes to make certain the dart dissolves. Then go down the way you came and back to the *pension* for a hot bath and a bracer of cognac.

As he came to within ten feet of Rungawa he raised the dart gun. It worked on air pressure, practically noiseless. No need to cock it. Five feet. He could see the nails on Rungawa's upraised hands, the pinkish palms contrasting with the black skin of the fingers and the backs of his hands. Three feet. Rungawa's suit was perfectly fitted to him, the sleeves creased carefully. Dry. He was wearing only a business suit, and it was untouched by the rain, as well-creased and unwrinkled as if it had just come out of the store.

"Not yet, Mr. Keating," said the old man, without turning to look at Jeremy. "We have a few things to talk about before you kill me."

Keating froze. He could not move his arm. It stood ramrod straight from his left shoulder, the tiny dart gun in his fist a mere two feet from Rungawa's bare neck. But he could not pull the trigger. His fingers would not obey the commands of his mind.

Rungawa turned toward him, smiling, and stroked his chin thoughtfully for a moment.

"You may put the gun down now, Mr. Keating."

Jeremy's arm dropped to his side. His mouth sagged open; his heart thundered in his ears. He wanted to run away, but his legs were like the marble of the statues that watched them.

"Forgive me," said Rungawa. "I should not leave you out in the rain like that."

The rain stopped pelting Jeremy. He felt a gentle warmth enveloping him, as if he were standing next to a welcoming fireplace. The two men stood under a cone of invisible protection. Not more than a foot away, Jeremy could see the raindrops spattering on the stony ground.

"A small trick. Please don't be alarmed." Rungawa's voice was a deep rumbling bass, like the voice a lion would have if it could speak in human tongue.

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Jeremy stared into the black man's eyes and saw no danger in them, no hatred or violence; only a patient amusement at his own consternation. No, more: a tolerance of human failings, a hope for human achievement, an *understanding* born of centuries of toil and pain and striving.

"Who are you?" Jeremy asked in a frightened whisper.

Rungawa smiled, and it was like sunlight breaking through storm clouds. "Ah, Mr. Keating, you are as intelligent as we had hoped. You cut straight to the heart of the matter."

"You knew I was following you. You set up this . . . meeting."

"Yes. Yes, quite true. Melodramatic of me, I admit. But would you have joined me at dinner if I had sent one of my aides across the street to invite you? I think not."

It's all crazy, Jeremy thought. I must be dreaming this.

"No, Mr. Keating, it is not a dream."

An electric jolt flamed through Jeremy. Jesus Christ, he can read my mind!

"Of course I can," Rungawa said gently, smiling, the way a doctor tells a child that the needle will hurt only for an instant. "How else would I know that you were stalking me?"

Jeremy's mouth went utterly dry. His voice cracked and failed him. If he had been able to move his legs he would have fled like a chimpanzee confronted by a leopard.

"Please do not be afraid, Mr. Keating. Fear is an impediment to understanding. If we had wanted to kill you, it would have been most convenient to let you slip while you were climbing up here."

"What . . ." Jeremy had to swallow and lick his lips before he could say, "Just who are you?"

"I am a messenger, Mr. Keating. Like you, I am merely a tool of my superiors. When I was assigned to this task, I thought it appropriate to make my home base Tanzania." The old man's smile returned, and a hint of self-satisfaction glowed in his eyes. "After all, Tanzania is where the earliest human tribes once lived. What more appropriate place for me to—um, shall we say, *associate* myself with the human race?"

"Associate . . . with the human race." Jeremy felt breathless, weak. His voice was hollow.

"I am not a human being, Mr. Keating. I come from a far distant world, a world that is nothing like this one."

"No . . . that can't . . ."

Rungawa's smile slowly faded. "Some of your people call me a saint. Actually, compared to your species, I am a god."

Jeremy stared at him, stared into his deep black eyes, and saw eternity in them, whirlpools of galaxies spinning majestically in infinite depths of space, stars exploding and evolving, worlds created out of dust.

He heard his voice, weak and childlike, say, "But you look human."

"Of course! Completely human. Even to your x-ray machines."

An alien. Jeremy's mind reeled. An extraterrestrial. With a sense of humor.

"Why not? Is not humor a part of the human psyche? The intelligences who created me made me much more than human, but I have every human attribute—except one. I have no need for vengeance, Mr. Keating."

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"Vengeance," Jeremy echoed.

"Yes. A destructive trait. It clouds the perceptions. It is an obstacle in the path of survival."

Jeremy took a deep breath, tried to pull himself together. "You expect me to believe all this?"

"I can see that you do, Mr. Keating. I can see that you now realize that not *all* of the UFO stories have been hoaxes. We have never harmed any of your people, but we did require specimens for careful analysis."

"Why?"

"To help you find the correct path to survival. Your species is on the edge of a precipice. It is our duty to help you avoid extinction, if we can."

"Your duty?"

"Of course. Do not your best people feel an obligation to save other species from extinction? Have not these human beings risked their fortunes and their very lives to protect creatures such as the whale and the seal from slaughter?"

Jeremy almost laughed. "You mean you're from some interstellar Greenpeace project?"

"It is much more complex than that," Rungawa said. "We are not merely trying to protect you from a predator, or from an ecological danger. You human beings are your own worst enemy. We must protect you from yourselves — without your knowing it."

Before Jeremy could reply, Rungawa went on, "It would be easy for us to create a million creatures like myself and to land on your planet in great, shining ships and give you all the answers you need for survival. Fusion energy? A toy. World peace? Easily accomplished. Quadruple your global food production? Double your intelligence? Make you immune to every disease? All this we can do."

"Then why . . ." Jeremy hesitated, thinking. "If you did all that for us, it would ruin us, wouldn't it?"

Rungawa beamed at him. "Ah, you truly understand the problem! Yes, it would destroy your species, just as your Europeans destroyed the cultures of the Americas and Polynesia. Your anthropologists are wrong. There are superior cultures and inferior ones. A superior culture always crushes an inferior, even if it has no intention of doing so."

In the back of his mind, Jeremy realized that he had control of his legs again. He flexed the fingers of his left hand slightly, even the index finger that still curled around the trigger of the dart gun. He could move them at will once more.

"What you're saying," he made conversation, "is that if you landed here and handed us everything we want, our culture would be destroyed."

"Yes," Rungawa agreed. "Just as surely as you whites destroyed the black and brown cultures of the world. We have no desire to do that to you."

"So you're trying to lead us to the point where we can solve our own problems."

"Precisely so, Mr. Keating."

"That's why you've started this World Government," Keating said, his hand tightening on the gun.

"You started the World Government yourselves," Rungawa corrected. "We merely encouraged you, here and there."

"Like the riots in Tunis and a hundred other places."

"We did not encourage that."

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"But you didn't prevent them, either, did you?"

"No. We did not."

Shifting his weight slightly to the balls of his feet, Keating said, "Without you the World Government will collapse."

The old man shook his head. "No, that is not true. Despite what your superiors believe, the World Government will endure even the death of 'The Black Saint.' "

"Are you sure?" Keating raised the gun to the black man's eye level. "Are you absolutely certain?"

Rungawa did not blink. His voice became sad as he answered, "Would I have relaxed my control of your limbs if I were not certain?"

Keating hesitated, but held the gun rock-steady.

"You are the test, Mr. Keating. You are the key to your species' future. We know how your wife and son died. Even though we were not directly responsible, we regret their deaths. And the deaths of all the others. They were unavoidable losses."

"Statistics," Keating spat. "Numbers on a list."

"Never! Each of them was an individual whom we knew much better than you could, and we regretted each loss of life as much as you do yourself. Perhaps more, because we understand what each of those individuals could have accomplished, had they lived."

"But you let them die."

"It was unavoidable, I say. Now the question is, can you rise above your own personal tragedy for the good of your fellow humans? Or will you take vengeance upon me and see your species destroy itself?"

"You just said the World Government would survive your death."

"And it will. But it will change. It will become a world dictatorship, in time. It will smother your progress. Your species will die out in an agony of overpopulation, starvation, disease and terrorism. You do not need nuclear bombs to kill yourselves. You can manage it quite well enough merely by producing too many babies."

"The alternative is to let your people direct us, to become sheep without even knowing it, to jump to your tune."

"No!" Rungawa's deep voice boomed. "The alternative is to become adults. You are adolescents now. We offer you the chance to grow up and stand on your own feet."

"How can I believe that?" Keating demanded.

The old man's smile showed weariness. "The adolescent always distrusts the parent. That is the painful truth, is it not?"

"You have an answer for everything, don't you?"

"Everything, perhaps, except you. You are the key to your species' future, Mr. Keating. If you can accept what I have told you, and allow us to work with you despite all your inner thirst for vengeance, then the human species will have a chance to survive."

Keating moved his hand a bare centimeter to the left and squeezed the gun's trigger. The dart shot out with a hardly audible puff of compressed air and whizzed just past Rungawa's ear. The old man did not flinch.

"You can kill me if you want to,"

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he said to Keating. "That is your decision to make."

"I don't believe you," Jeremy said. "I can't believe you! It's too much, it's too incredible. You can't expect a man to accept everything you've just told me . . . not all at once!"

"We do expect it," Rungawa said softly. "We expect that and more. We want you working with us, not against us."

Jeremy felt as if his guts were being torn apart. "Work with you?" he screamed. "With the people who murdered my wife and son?"

"There are other children in the world. Do not deny them their birthright. Do not foreclose their future."

"You bastard!" Jeremy seethed. "You don't miss a trick, do you?"

"It all depends on you. Mr. Keating. You are our test case. What you do now will decide the future of the human species."

A thousand emotions raged through Jeremy. He saw Joanna being torn apart by the mob and Jerry in his cot screaming with fever, flames and death everywhere, the filth and poverty of Jakarta and the vicious smile of the interrogator as he sharpened his razor.

He's lying, Jeremy's mind shouted at him. He's got to be lying. All this is some clever set of tricks. It can't be true. It can't be!

In a sudden paroxysm of rage and terror and frustration Jeremy hurled the gun high into the rain-filled night, turned abruptly and walked away from Rungawa. He did not look back, but he knew the old man was smiling at him.

It's a trick, he kept telling himself. A goddamned trick. He knew damned well I couldn't kill him in cold blood, with him standing there looking at me with those damned sad eyes of his. Shoot an old man in the face. I just couldn't do it. All he had to do was keep me talking long enough to lose my nerve. Goddamned clever black man. Must be how he lived to get so old.

Keating stamped down the marble steps of the Sacred Way, pushed past the three raincoated guards who had accompanied Rungawa, and walked alone and miserable back toward his *pension*.

How the hell am I going to explain this back at headquarters? I'll have to resign, tell them that I'm not cut out to be an assassin. They'll never believe that. Maybe I could get a transfer, get back into the political section, join the Peace Corps, anything!

He was still furious with himself by the time he reached his *pension*. Still shaking his head, angry that he had let the old man talk him out of his assigned mission. Some form of hypnosis, Keating thought. He must have been a medicine man or a voodoo priest when he was younger.

He pushed through the glassed front door of the *pension*, muttering to himself, "You let him trick you. You let that old black man hoodwink you."

The room clerk roused himself from his slumber and got up to reach Jeremy's room key from the rack behind his desk. He was a short, sturdily-built Greek, the kind who would have faced the Persian army at Marathon.

"You must have run very fast," he said to Keating in heavily accented English.

"Huh? What? Why do you say that?"

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The clerk smiled, revealing tobacco-stained teeth. "You did not get wet."

Keating looked at the sleeve of his trench coat. It was perfectly dry. The whole coat was as clean and dry as if it had just come from a pressing. His feet were dry; his shoes and trousers and hat were dry.

He turned and looked out the front window. The rain was coming down harder than ever, a torrent of water.

"You run so fast you go between raindrops, eh?" The clerk laughed at his own joke.

Jeremy's knees nearly buckled. He leaned against the desk. "Yeah. Something like that."

The clerk, still grinning, handed him his room key. Jeremy gathered his strength and headed for the stairs, his head spinning.

As he went up the first flight, he heard a voice, even though he was quite alone on the carpeted stairs.

"A small kindness, Mr Keating," said Rungawa, inside his mind. "I thought it would have been a shame to make you get wet all over again. A small kindness. There will be more to come."

Keating could hear Rungawa chuckling as he walked alone up the stairs. By the time he reached his room, he was grinning himself. ■

IN TIMES TO COME

● Most of us tend to assume (even while budgets are being slashed) that when the road to space is opened to everyday commerce it will be dominated by one of the present "great powers," such as the U.S. But is that necessarily so? Lee Correy's *Manna,* a three-part serial illustrated by Vincent di Fate, shows us a quite plausible 21st century in which things have worked out differently. That leading role has been taken by a tiny Third World country with no special advantages, really, except being the first to recognize a new fundamental principle of economics—and being willing and able to modify its social institutions accordingly. Needless to say, that kind of upstart is not viewed with purest affection by its more established competitors....

Our May issue also contains, by a rather neat coincidence, a pair of thought-provoking stories by Timothy Zahn and Marc Stiegler, which might be lumped under the heading of "matters of life and death." One raises some challenging and important questions about the beginning of life; the other does the same for its end.

David Brin's fact article is a biggie, but for good reason. Called "Xenology—The New Science of Asking 'Who's Out There?'," it brings us up to date on scientific thinking about extraterrestrial life, which has undergone a couple of revolutions recently. If the authors are paying attention, they should get some story ideas out of this one—and it also poses an explicit and intriguing challenge to you, the readers.

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EXILOCO PARENTIS

Bob Carrico

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Some things must be not only earned, but paid for. Willingness to pay the price may be the final test of deserving.

Janis DeLore, age 13, Provisional Adult, entered her apartment bearing a large sack of groceries. Placing the bag on the counter, she hit the mailout panel. Two letters spewed forth. One was from the gas and power company. She began disarming it—then stopped. The other, large and red, was from the Department of Adult Welfare. The seal of the New World State, a large silver-embossed image of the Earth, was prominent.

Janis's thumbprint defused the seal. Two papers dropped out, one obviously the letter. Janis smoothed it out on the flextopped counter and read it.

June 00, 2097

Department of Adult Welfare
Special Code 097-003

Miss DeLore:

We are pleased to inform you that your preliminary application for the July Adult Testing Program has been accepted. Therefore, on July 10, 2097, at 0815, you will report to the testing center at the address above. The tests will last until 0400.

Fill out the enclosed form and return it with a ten point five credit remission for the subsidiary charges. If this form is incorrectly filled out, you will be ineligible.

Requirements are listed in the Computer Testing Study Unit, accessible from any government-sponsored study area.

We wish you the best of luck in this endeavor.

Yours truly,

Department Of Adult Welfare

Janis couldn't believe it. They'd finally accepted her application! She now had a chance that few had at her age—to become a Full Adult with *all* the privi-

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ileges of the New World State, not just some of them.

It was going to be hard to find time to study, though. Between her night classes and her early sleeping hours, it was going to be almost impossible. Oh, well, first things first. And the first thing in this case was to get the form filled out and sent off. Then she could worry about studying.

Getting to work was an ordeal Janis had to endure five or six hours a week. Up at 0625, dress, eat, catch the 0705 bus, then the 0715 shuttle from Queens to Manhattan, enduring snickers and an occasional open insult from adults along the way. Those idiots! Still stuck in the ridiculous old conception that being *old* meant being *better*, when all it meant was being flabby, paunchy, and, Janis sometimes thought, stupid. Oh, well. It was endurable.

Finally Janis sat down at her console. She had fifteen minutes to study before the book winked out, to be replaced by:

GOOD MORNING, MISS DELORE. WE HAVE SEVEN BOOKS FOR YOU TO CLASSIFY. THESE ARE . . .

Janis sighed and settled back to work.

After work, Janis went to one of the compterms in the main body of the compbrary. She keyed it to ATD and watched the titles flick over the screen. Choosing one, she settled back and began reading rapidly. When the door beeped with time-up signals, she appeased it with an offering of 25n¢.

After five hours, Janis exited. Exhausted, she went to a computerized 24-hour drugstore and bought a painpill. As she walked along the Reagan Bridge toward the bus-term, she wondered how she was going to stand this for—

"Okay, hands up, sister."

Quietly, Janis panicked. A renagade? A vigilante? Better stick to the renegade. That was bad enough.

"Give me your purse."

Not on your life, you brainless idiot! Janis began handing her purse over.

Then she swung it up.

The renegade/vigilante was hit in the face. His gun went high, but not high enough. Janis vaulted wildly aside. The shot missed her. Abruptly she was swinging over and falling. With a wild shout she slammed one arm against the bridge—and had it. She dangled precariously by one hand from a rubberite-fabric strip of road. Her purse fell from her hand and splashed into the water.

Footsteps came overhead. "Did you get it?"

"Naah. She fell in. Maybe that'll teach her to run away from home! Well, let's go." The footsteps faded.

Janis clambered onto the road. *All my money's gone. I guess I'll have to call the police. Groan. Why did I try that stupid trick anyway?* She began walking toward the bus-term.

Three days later, Janis was forced to admit this was getting hopeless. She was only six chapters into the thirty-chapter book. As much as she hated to, she had to look into ATF.

After work the next day, instead of going to the compterms, she went to the Government Information Office. She entered and coded in her Social Security number to get a booth. Once she keyed shut the door, the terminal lit up with the words:

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GOVERNMENT INFORMATION NETWORK. CHARGE RATES 50n¢/min.

Talk about expensive! But she had to do it. Double groan. She inserted her filing slip. The left corner of the screen gave the money remaining in her government Social Security account. The screen itself gave the menu. She punched for Adult Welfare, and from there to Adult Testing Fund.

The screen read:

THE ADULT TESTING FUND WAS SET UP IN 2000 AS A MEANS FOR THOSE BEING TESTED FOR FULL ADULTHOOD TO HAVE MAXIMUM STUDY TIME WITHOUT HAVING TO WASTE TIME ON WORK TO MAINTAIN THEMSELVES. TO BE ELIGIBLE, THE APPLICANT MUST:

1. BE ELIGIBLE WITHIN ONE MONTH FOR FULL ADULT TESTING.

2. HAVE LESS THAN n$50,000 TOTAL LIQUID ASSETS.

3. HAVE A JOB OCCUPYING MORE THAN FOUR DAYS A WEEK AND SEVEN HOURS PER DAY.

APPLICATION FORMS ARE AVAILABLE AT ANY ATF OFFICE. *YOU HAVE ONLY TEN DAYS FROM NOTIFICATION TO FILE.*

FOR MORE PRESS "M." FOR HARD COPY PRESS "H." ELSE PRESS "ENTER."

Janis tapped "H." The compterm printed out from its underdesk printer. Janis switched off the terminal, tossed her filing slip in the incinerator, and left the booth.

The next day after work Janis again abandoned her computer terminal. She caught a comptaxi to the Department of Adult Welfare. Then she took an elevator to the Adult Testing Fund division on the fifteenth floor.

A lady about fifty years old sat in the front office. She looked at Janis through thick glasses. "Hello, dearie. What do you want, the directions to the ladies' room?"

Janis suppressed her irritation. "No. I would like to apply for the Adult Testing Fund."

"Sweetie, that's only for people who're taking the tests. Run along, now. All these nice gentlemen need help."

The lady knew as well as Janis that there was only one person behind her. "Madam," said Janis, drawing herself up, "I am *taking* the tests. In less than a month."

"Then where's your punched card, dearie?"

Janis reached into her satchel and drew out the Test Identification Card.

The woman examined it. "Dearie, did you get this from your momma's purse? Let me see your ID card."

Janis started to say something, then restrained it. She jerked her card roughly from her satchel and gave it to the woman.

The woman examined it. "What's your momma's name? The same as your own?"

That did it. Taking her ID and TIDC from the woman so smoothly it did not look as if she had grabbed them, Janis said, "Madam, this harassment is illegal. I am a Provisional Adult of the New World State, and I will not be intimidated by the likes of you. I shall get my form from another office, and report you to your superiors. Good-by." She marched toward the door.

The woman's composure cracked.

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"Why, you arrogant little snot! You can't talk to me that way!"

"I just did," replied Janis haughtily over her shoulder.

Well, one thing was for certain, she thought as she left. She was going to hold out *without* going on semi-welfare. She'd find extra study time somehow.

She wrote her complaint letter in the comptaxi, so as not to waste any of it.

Janis got her extra study time quite simply. She got up at 0400 every morning, caught the 0430 bus—the earliest one out—ate at a greasy spoon across the street from the compbrary, and then entered and read. After work, she studied from 1705 to 2300 and caught the 2330 bus, the last one back.

It didn't do much good, however. She often had to reread chapters she'd read early in the morning or late at night. Several times she'd forgotten completely where she'd stopped. Once she fell asleep in the booth, waking up at 0715 the next morning.

She finished the book on June 19 and began working on another one. Her average reading speed was now up to three chapters a day—but she had three more books to read. Minimum. Seventy-five chapters in twenty-five days—when she only had nineteen. This would never do.

She began trying a comptaxi to go earlier, but stopped when she noted the alarming state of her funds. But there was *no* way she was going through that ATF again!

When she received the ten-day notice at the beginning of July, Janis's resolve cracked and she began looking into illegal means—Gyro. Gyro was the pill that distorted your time sense—everyone knew that. It was not addictive to a fairly strong-willed person—everyone knew that. Some drugs passed out with it were—everyone knew that. It was a gross misdemeanor or Class G felony to use it—everyone knew that. You could get it in most big-city slums—everyone knew that. What everyone didn't know was exactly where.

So Janis went to find out.

It was lucky that Janis was fairly awake the Sunday she went out to find Gyro. Fifteen minutes after she reached the slums, she was attacked.

It started with a brick—a brick that missed her head by two inches. She spun. A menacing-looking white male, stoned out of his head, approached. "One of them little kids, eh? The ones who filled up all our jobs, eh? Well, I figure we can do something about that." He giggled and flicked out a large knife.

Janis took off. "Hey, boys!" yelled the vigilante. Three others appeared from nowhere. Janis zigged, then zagged across the street. Several other menacing-looking boys appeared out of doorways and off street corners.

They cornered her two blocks later against the side of a building. She had no way to escape. No—there was the fire escape. She scrambled up it. Her pursuers followed.

At the top of the fire escape, the roof was only a foot above. Janis jumped onto the fire escape rail. It swayed alarmingly. She scrambled onto the roof just as the concrete snapped off and fell into the alley.

Laughs and curses followed. The boys were clambering up onto the roof. Two or three slipped. They laughed as

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they fell, grabbing window ledges or the fire escape and clambering up wildly.

And then there was no escape. She was against the edge of the roof, and the teenagers seemed all around. If she jumped off the roof as those boys had—

Shivering, Janis clambered onto the edge of the wall. She poised herself over a sickeningly long drop, and glanced down into the alley below. *I'm not* ready *for this!*

She jumped.

She fell slowly, tumbling—

And hit a window ledge. She grabbed it crazily and climbed up. She made it to the fire escape, ran down two stories, and took off into a side alley. She ran fifteen crazily twisting blocks until she was sure that she had lost the teenagers. So much for Gyro, she thought. If those are the kind of idiots that use it, I don't want it.

She called a comptaxi to get home.

Janis took two days of her vacation before the testing date. She bought some Sleepide and went on a mild sleep binge, sleeping fifteen hours out of every twenty-four.

The day finally arrived. Janis got up at 0730. At 0805 she entered the building, went to the tenth floor for the D's, and was assigned a console. The testees were gathered around a large circular table with slots in it. Each had a computer console.

At 0815 walls suddenly slid into the slots, and she was cut off from the outside world. Simultaneously, the console switched on.

The first section was a standard Swennen-Walters Intelligence Test. Janis had passed it during her exams for Provisional Adult, and she was sure she could pass now. It was the next area that worried her.

At the end of the test, the console displayed a list of professions. Under it was:

PICK ONE OR PRESS ENTER FOR THE NEXT LIST. THIS WILL DETERMINE YOUR TESTING AREA IN THE NEXT PART OF THE EXAMINATIONS, THE SWENNEN-WALTERS JOB ABILITY TEST, TO DETERMINE YOUR ABILITY IN YOUR CHOSEN FIELD. Janis pressed ENTER. She continued pressing ENTER until she found COMPUTER ORGANIZER/PROGRAMMER, then entered its number.

Two minutes later the console deactivated and the walls slid back. "Please go to the room number you will receive at the door for the next area of the Swennen-Walters Maturity Test," boomed a tape-recorded voice from a ceiling speaker.

Janet did so. The room's sole occupant was a computer console atop a desk and chair set. The door shut and locked behind her. Janis had a horrible thought — what if there was a fire and the door mechanism malfunctioned? She threw it out sternly and proceeded.

The test was a long series of questions on computers, languages, and programming, following which she was required to write programs in several languages. Then the console displayed, YOU ARE FINISHED. PROCEED TO PART THREE OF THE SWENNEN-WALTERS MATURITY TEST.

Then the door opened. A thirtyish man with orange-blond hair and wire-rimmed glasses met her. "Hello, Miss DeLore. I'm Simon Preston, and I'm to give you the third section of the maturity tests. Let's go to my office."

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They went to a comfortable room with a desk, chair, and couch. On one wall was a degree in psycho-compo-pharmoanalysis from the University of Kentucky. Janis studiously ignored it.

"Now," said Preston briskly, "do you know what I have to do on this section of the test?"

Janis was annoyed: she didn't like brisk people. "Yes, I do," she said just as briskly. "You inject Craniatone to induce a receptive state in the subject, then use drug-supplemented hypnosis to regress the subject to theoretical 'split points' in his life to test sociological reaction and maturity."

"Well memorized," said Preston. "Let's get on with it, shall we? Take off your clothes."

This was a somewhat awkward order to carry out, but Janis did. She lay down on the couch beside an imposing-looking cabinet and rolled over, feeling the doctor attach various monitors. Then she heard him say, "Here comes the Craniatone." Her last thought was that she was glad she would soon be leaving this man. Then she felt a needle prick. A split second later her brain shut down completely, refusing to function except in response to direct outside stimuli. Then she felt a second prick—and blacked out.

It was the summer of 2006. Janis was at summer camp. As she headed toward the Handicraft tent, Thomas R. Jensen, the idiot who had a crush on her, approached. He smirked his stupid smirk. "Say, Janis, how about we—sneak out of the hunting-safety movie tonight? Huh?"

Janis, as usual, resisted an impulse to tell him just what she thought of him. She walked away in extreme disgust.

Later, Janis noticed Sam Davis in a corner of the camp behind the mess tent. He was holding a large Indi-made throwing knife—one of the set she had given him at Christmas. He was an expert with them. She watched the smooth movements of his arm, leg, chest, and wrist muscles as he threw them. Perfect. She almost asked him the same question that Tommy Stupid-o had asked her, but he would be disgusted—he had a mind.

Wait a minute. Any item made in an unconverted zone such as India was strictly prohibited by camp rules. Hmm. Should she report him? She chewed her lip for a while.

Finally she went into the superintendent's office. "Sir? Don't tell him I told you, but—"

Finally Janis woke up. Preston was putting his equipment away. As she reached for her clothes, Janis said, "Doctor, how can you derive moral age from incidents like those? They seemed trivial when they happened, and they still do."

"Taken as events," replied Preston, shutting the cabinet, "they are. But when combined with the readings off these instruments, and taken as a whole, they form a coherent structure from which moral age can be derived. Swennen and Walters showed how to use the structure to do so. You can leave any time." He touched a button on his desk; the door unlocked.

Soon Janis left, striding out into the sunlight. She'd done all she could and

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taken the test. There was nothing left to do but wait.

Three days later, Janis barged into her apartment and slapped the mailout. She had been disappointed the past two days; no red-and-silver envelope had popped out.

But now the wait ended. The red and silver swirled out of the tube.

With mounting excitement, Janis reached for the letter. *This is it!* She took a deep breath and slammed her thumb on the seal.

July 13, 2007

Department of Adult Welfare
Special Code 047–003

Miss DeLore:

We are pleased to inform you that, if you so wish, you now have the option of becoming a Full Adult. Please note that this is an irrevocable decision involving many risks and responsibilities. If you would prefer to be returned to the legal status of Child, please inform us immediately.

Yours truly,

Department of Adult Welfare

Janis put it down.

Did she want to become a Full Adult?

It was a small, nagging, and growing thought. After all, look at what her present status had gotten her so far. It might have given her some removed limitations, but it'd also gotten her a lot of trouble. Attempted robbery and murder—old crones who simply *wouldn't* believe her—insults and snickers.

Should she do it?

Janis considered—and finally chose. No, she'd gone through too much to quit. It might be hard, it might be almost impossible—but she'd do it.

She tore apart the letter and tossed it in the incinerator. Then Janis DeLore, Full Adult—*Real* Full Adult—went out to celebrate. ■

"People of all ages die of heart disease and stroke."

With your help, we're out to change that.

American Heart Association
WE'RE FIGHTING FOR YOUR LIFE

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IN THE FACE OF MY ENEMY

Joseph H. Delaney

Certain "small favors" can have very long-range consequences.

Brad Hamann

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PROLOGUE

The broken creature hung suspended on fields of force, amid devices half matter and half energy, flung into patterns and functions unfathomable to but a few minds in all creation.

"It is loathesome," said one voice to the other. "Does it live?"

"Its life force is near extinction, but now static. It is primitive, yet I believe it truly thinks."

"It intrigues you?"

"Indeed. As it is now, so we once must have been. I will, therefore, know this being, and ourselves of yesterday."

It probed the body of the beast, and knew it, and was saddened. "Tragic," it remarked. "I have descended into its cells. What ghastly inefficiencies. They battle; they eat one another. They are predator and prey within the organism. Equilibrium may be briefly achieved; never harmony."

"The damage appears complete. What will you do?"

"I shall make repair; observe it in life and function."

The being touched the broken form. With disciplined force he built anew according to its pattern.

"Fascinating. It lives. For a time there is balance. It struggles to retain this, but the struggle cannot endure long against the inner conflict. It spends its energy to forestall destruction, yet it spares enough for thought."

"That is conjecture."

"No. It is fact. It is conscious of its existence. It conceives the flow of time. It questions its reason to be. This is sentience. It calls itself 'Kah-si-omah.' "

"Perhaps, in time, that will be fact. It does not appear presently probable. If it snatches only fleetingly at this sensory flood, how can it learn?"

"Perhaps it learns only small things. We may yet determine this, for I grow curious. Perhaps we shall never again pass this way, yet if by chance . . ."

"What will you do?"

"I shall change it; bring discipline, provide order. You will perceive its present lack."

"Indeed. Observe; the cells replicate, and as they replicate they drift. The process is unfaithful and unhealthy for the creature, yet the organism permits it. It is as you said; they eat each other."

"I shall adjust."

"How? The drift is cumulative. Each replication deviates a little further. Chance alone determines how far. It is the pattern that is faulty. The fidelity of replication cannot endure under purely chemical control. More is needed."

"Restraint? Yes. Brilliant."

"You set yourself an exceedingly difficult task."

"True. It will be challenging. Observe, these large cells function differently. They are the keys. They interconnect throughout the organism. They are the vehicle of its consciousness. They are subject to the being's command."

"If such it has."

"There is room within them for innovation. I shall form echelons of them, and cross-controls. Command will ascend to the being's core of consciousness."

"The endeavor seems worthwhile. I shall observe your efforts. I may, perhaps, comment."

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"I would be pleased if you should do so."

Again, the boundary obscured. Matter melded with its higher state. Subtle changes followed.

"Interesting. Satisfaction must surely be yours."

"Indeed. Observe: even as we watch its wounds heal, its form regenerates and returns to it. Control descends from its center of consciousness and seeps into the cells."

"It is still loathesome."

"It now need not be. Its will controls, sluggish though it is. Perhaps the creature hears you. Properly contrite, it may experiment and find a form more pleasing to you."

"It lacks the intellect."

"No, not the intellect; the experience. It has lived but the instant nature gave it. I have given it eons more.

Time passed. The dalliance ended. The need which had brought visitors to this young world was satisfied. Their vehicle, having probed the bowels of the mountain, having found, extracted and refined the fissionables it sought, now rose from the blackened slag pit, where it had rested so long, and squandered the energy it had gathered in its journey between suns.

Their toy, transformed, and this time safely out of harm's way, watched, mystified. It did not comprehend the works of gods, nor now, even itself.

I am not a coward by nature, though surely there is a little cowardice in all of us. And mine surfaced as soon as I could make out the features of the man disembarking from the shuttle. It was Ivan Carmody himself, my boss.

There are men. Also, there are MEN. The difference is one of kind, not degree, and the mind perceives it instantly, unerringly, and inexplicably.

One approached whom I feared, but to whom duty demanded I explain the other. And I wondered if I could.

My months on Campbell had been filled with many strange experiences, some of which, I felt, were better left out of my report. But this, Carmody; HE, I feared; HE would demand to hear them all. And worst of all, I knew, I would tell.

I was too minor ever to have met him face to face, of course, until now, but as Secretary of Extraterrestrial Affairs he was the U.N.'s most powerful figure, and its most colorful.

As he approached, I understood why, for he was imposing. Tall and gangly, he had the look of an eagle about him, from the straight white hair he wore combed back to the huge curved beak of his nose. The thick glasses perched on its bridge magnified piercing green eyes that did not blink.

If he overwhelmed me by his physical presence, it was nothing compared to the devastation created when he spoke, and I hoped I could stand the strain.

"Kimberly Ryan," the voice boomed. "Are you in charge of this mess?"

I glanced around me at the muddy street, the burned-out buildings and the crushed equipment. Some of the men who had watched the shuttle's approach had skulked away at his sight. "Yes, sir. I have assumed command under Emergency Regulation Number 309," I said, hoping I had cited the right one. I felt his stare on my body; at the rough leather clothing that Casey had made for

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me. "This is all I have left, Mr. Secretary. Everything burned."

"I'll want to hear your report immediately, Miss Ryan, preferably not out here in the street."

"Yes, sir. We can go to Solar Minerals H.Q., to Mr. Meyers's office. What's left of it, that is. I'll show you the way."

I turned and started off down the street, trying to stick to the dryer spots. He followed along a pace or two behind.

"Where is Meyers?"

"Dead," I told him. "He shot himself before the settlement, uh, fell, when he thought the aliens were going to fire the building. I can send for Mr. Bigelow, though. He's in charge of Solar's operations now, I guess."

"No. I want your report first. We may be filing charges against the management, including Mr. Bigelow."

I reached the stairs and started up, wondering if the flight would hold both of us in its damaged condition. It had taken a glancing hit from the catapult, which had partially destroyed the landing, but Carmody did not hesitate to risk it. He followed me up the twenty or so steps closely enough for me to hear him panting.

We entered Meyers's office and Carmody took it upon himself to sit at Meyers's desk, in Meyers's chair, despite the fact that the back rest was still spattered with dried blood and brains. He propped his chin on his hands, leaning over the desk, hunching forward and looking right at me. "Find a chair, Miss Ryan. I don't like looking up at people."

I pulled one of the rough-hewn chairs closer to the desk and sat down carefully, mindful that it contained splinters, and when I was as comfortable as I could be in the presence of such awesome power, I asked him where he wanted me to start.

"At the beginning, Miss Ryan; from the time you set foot on Campbell. And you will omit nothing; is that clear?"

"Very. But actually, it really started before I ever got here. I found that out later; Mr. Bigelow told me."

Carmody slapped the fingers of one hand against his chin. "Whatever," he said.

"Well, evidently he—that is, Captain Corsetti—he was the master of the *Wilmington,* had orders to buy a little time for Meyers before I got here. He called Meyers on the radio as soon as we were in orbit and warned them I was coming. That's an indication to me that Solar management back on Earth knew about the cairn, and meant to conceal it from . . ."

"Forget that part. I'll take care of them. I want to hear about this Indian; what's his name?"

"Kah-Sih-Omah. But we called him Casey. How did you hear about him?"

"Never mind. Get on with it."

"Yes, sir. Well, here again, some of this is second-hand from Bigelow, and it was much later when I found out about it, but to begin with, I certainly didn't hit it off with Mr. Meyers. He knew why I was here, or thought he did, and he saw his job about to be snatched out from under him. He'd be through if I learned of the cairn."

"Without comments, please, Miss Ryan. Stick to what's relevent."

"I'm only trying to show his attitude, Mr. Carmody."

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Carmody seemed to give up at this point. He didn't respond, and I felt safe in going ahead, repeating as much as I could remember, verbatim.

And it had started out innocently enough; I'd merely thanked Meyers for meeting me at the dock. His reply had been harsh.

"I didn't come down here for that, lady. I came down here to check cargo. As far as I'm concerned, you can go back on the next barge. What do you want here, anyway?"

"You know why I'm here, Mr. Meyers. I'm here to make the ecological survey. That's the law. No planet can be opened to colonization or exploitation until the U.N. Ecological Committee has approved it and imposed the necessary restrictions. That's my job, okay? I'm not looking for a fight."

"Nor am I. But I've got enough work to do now without looking after you, and without wasting time leading you around."

"I don't need looking after. I don't need leading. I can find my own way around. You won't even know I'm here."

I started to leave, and that was when he grabbed me by the arm. It hurt, and I suspect this was his intention. I couldn't shake loose. "Get your hands off me," I demanded. "I'm an officer of the United Nations. You could go to jail for this."

He let go, but left big red marks. "Have it your own way, lady, but keep this in mind: there are 450 healthy construction men on this planet, and no women. Some of them have been here two years without a woman. Maybe I won't know you're here, but every one of them will before you're off this dock." He'd have been all right if he'd stopped there, but he didn't. "Course, maybe that's the way you like it. A girl like you could get rich in the four months you'll be here."

I knew it was a mistake when I did it. I lunged and threw a punch.

He stopped me easily with one ham-like hand. "There'll be none of that, lady. On Campbell I'm the law: judge, jury, and all the rest of it. Assaulting me ought to be worth ninety days in the brig, at least. Bigelow," he called.

A big, sleepy-eyed man came over. Meyers called him Scotty. I didn't know it then, but he wasn't quite as harmless as he looked. Bigelow was the project architect. He was responsible for erecting the landing web, but he had a sideline too. He was a part-time assassin.

I went with him to the operations building, where Meyers had told him to take me immediately. Meyers hadn't been subtle about that, although he did try to mask his real purpose. I heard him tell Bigelow to find somebody big, ugly, and stupid to be my bodyguard.

Bigelow had seemed nice enough at the time, though he too gave me to understand I was in the way; they had deadlines to meet, that any delay, however slight, cost the company and the consortium to which it belonged great sums of money, all of which had to be made up to the investors who would bid on the minerals when the web was finished. He, personally, feared for his bonuses, which field management would not get if they didn't make the deadlines. And he told me all about the expensive family he was supporting on Earth.

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I stood there, locked in a back room feeling sorry for him, and even for Meyers, although I still didn't like Meyers. I was a problem to them, and maybe in their place I'd have felt the same way, guarding against 450 potential rapists.

It seemed like hours before he returned. I amused myself by staring out the one window the room contained. It overlooked a muddy street remarkable for its complete lack of traffic. Then Bigelow came back into view followed by a hulking, shambling figure dressed in bib overalls and a hard hat. He wore no shirt, and from beneath his hat fell long black braids, which lay on coppery-skinned shoulders. He was as massive as he was brawny. Bigelow had followed orders in one respect; the man was big. At the time I hoped he was not too dumb, though he gawked around like a tourist. He was not ugly; he was simply ordinary.

Bigelow introduced him as K.C. Oma.

"Hello, Mr. Oma." I said.

"I am called Casey," he replied, somewhat shyly. "I am pleased to meet you. Are you ready?"

I thanked Bigelow and followed Casey down the stairs and into the street, walking slightly behind him, watching him. He moved like a shadow, without effort or urgency, and I found myself admiring him for the graceful way he managed that massive form. I had known Indians before, and that was no doubt what he was, considering the prominent nose and high cheekbones, which seemed to highlight the copperish cast of his skin. He was tall enough and light-skinned enough to have been a Northern Sioux, but they were rarely as heavy.

We did not speak until we were inside the suite: a foyer, a kitchen, and two bedrooms, all of rough-sawn native timber and sparsely furnished with articles of the same material. "Not the Ritz," I said, "but adequate." Then I realized how dumb that sounded.

I looked around. There was my luggage in the larger bedroom. I peeked into the other one. In it was a beat-up military-style duffle bag.

Before I could ask the question, Casey answered it. "Mine," he said, "I am to guard you every moment." He said it like he really meant it.

I felt the words of protest rise in my throat. But there they stopped, unuttered, and I thought, *It does seem reasonable*. Who could menace me with him nearby? And he did seem nice enough. So I said instead, "Fine, I'll try not to be any trouble."

And then, with great innocence, he remarked, "You do not trouble me at all, Miss Ryan. Tell me, what is it you will do here?"

"I'm a busybody, Casey. Haven't they told you?"

He shook his head gravely and grunted a cautious "No."

I realized I was behaving defensively; making this simple man the object of my revenge for the hostile reception at the dock. "Forgive me," I said, "I meant to say I'm here on an ecological survey of the planet, to see if the presence of men will harm it: hurt the local life forms, or create hazards for future colonists, that sort of thing. Understand?"

"Yes, Miss Ryan."

"I'll need to go out in the field, per-

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haps for days at a time, and I assume that means you'll go too."

"Yes, Miss Ryan. I shall go."

"Have you been out there before?"

"Only near the station, never far in."

At first, this answer disturbed me, and I was angered that Meyers had not furnished me with an experienced guide; but then, after thinking it over, I liked this better. This way I could choose where to go, and this simple man seemed so sincere in his assurances that I believed he could and would protect me, even from Meyers.

"Fine, we'll get started in the morning. We'll need a skimmer. I assume you can arrange that, and that you can drive one."

"Yes, Miss Ryan, I can."

My next question was redundant, in the light of what I later learned, but at the time it seemed appropriate, and Casey took no offense. "We'll be camping out for several days, Casey. You'll need to collect equipment and food. I assume you know a little something about camping and cooking."

"I can manage, Miss Ryan. I will obtain what we need and be ready by morning."

He got me settled in, then left me behind locked doors to make preparations. I did not know at the time what a foment I had caused, or what drastic preparations Meyers and Bigelow were making to insure I did not leave Campbell with word of the cairn. Though it lay far away in dense woods, and the odds I would find it were astronomically high, they were unwilling to risk even that, fearing that if its existence were known their operation would be halted until we had determined what it represented. Perhaps they thought we could consider it the mark of some other race's claim to Campbell and order the planet abandoned.

They had already tried to destroy it, with no success whatever, and the effect of modern explosives upon it was nil. Man could not have built it, and he could not demolish it either. Later I learned that Meyers had considered burying it under a mound of dirt but my unexpected arrival had left him no time for that. So they decided instead to destroy Casey, the big, dumb, expendable Indian, and me.

We did not know that then, the morning we left the station aboard a skimmer loaded with death.

At first the day was pleasant, though we were cool to start with, both in shorts, but this area of Campbell was tropical and soon it grew hot, even with the blast of the skimmer's fans to cool us. We headed inland, across the coastal plain where proto-grasses flourished, but these gave way to a cycad-like growth, which was evidently a survivor of the planet's earlier plant evolution. Farther in in the uplands, they were rare, supplanted by larger organisms closely resembling terrestrial trees.

There was much of interest to see, and we flew low, just high enough to avoid obstacles, while I drank it in. We spoke little, beyond what was necessary to call each other's attention to some new curiosity. I was too excited to risk missing something, and he too taciturn.

Our course was leisurely, and we followed the streams that flowed down from the highlands to the sea. Here life teemed, and we stopped many times to observe and photograph it, hanging on

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the skimmer's fans, and hovering silently over small herds of little animals which gathered at the streams to drink.

Campbell was made for skimmers. Its sun was bright and poured its energy into the cells that covered our hull, from which it flowed into the plastic batteries built into it, thence into the motors which drove the fans. Riding in one made me feel detached, as though it was the magic carpet of old Arabian Nights.

Nightfall found us in the highlands, where the air was cooler. Casey set up a tent for me, there among the trees, and we ate from supplies brought from the settlement. Casey, whether out of shyness or out of some unspoken preference, refused to occupy the tent, but instead rolled up in a blanket outside.

By then he had demonstrated he was no stranger to the woods. He had laid out the camp in an expert manner, with the tent rigidly erect on taut ropes, and perched for drainage on a little hummock. His fire blazed brightly and cleanly, fed with dry, dead wood, and banked carefully to last the night. Whatever doubts, whatever reservations I had about the man disappeared that night. I slept as soundly in my tent as I ever had on Earth.

The morning brought the smell of fresh coffee into the tent, borne on a gentle breeze. I rose to find Casey bent over the fire, cooking breakfast. Around us there was a heavy fog, which swathed the tops of the trees and blotted out the half-risen sun.

I took the steaming mug from him and tasted it, while he divided the contents of the skillet onto stainless steel plates. It, too, smelled wonderful, and I found myself drawing deep breaths of Campbell's morning air into my lungs. And I said to him, "Casey, this is why I'm here. Smell that air. Nothing like it exists on Earth—anywhere. All that, man spoiled long ago. But I mean to see that no one spoils this."

He handed me a plate, which I took gratefully, but he said nothing. Instead he met my gaze, pausing a brief moment before resuming his task. Had that been a tear in his eye? From the smoke, perhaps. Surely not because of what I'd said. But then, of course, I did not know that Casey had seen it all before.

We ate, struck camp, wiped the condensate from the skimmer's cells, and started off again. More and bigger trees appeared, growing in clumps, not yet numerous enough to become continuous forest. They yielded a kind of nut, on which fed little beasts about the size of cats. We saw the first sizable group of them that morning. They were quadrupedal, but had good manipulative ability in their front paws, and scurried about gathering and crunching nuts despite our approach.

I did not know a great deal about Campbell's life forms. What I did know came from survey reports which were made by the first scout teams to visit here, and like all survey reports they covered only the obvious.

They had, to their own satisfaction, ruled out the existence of intelligent life; a fairly safe bet, since Campbell appeared to be geologically younger than Earth, and its life consequently less highly organized. There were evolutionary confluences, of course, but on this land mass, at least, these did not extend to large grazing forms or to large predators.

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Campbellian protein was organized slightly differently from the terrestrial norm, and utilized different amino groups in its structure. Most of it was simply useless as food for human beings, who couldn't metabolize it, but some of it was poisonous as well.

We observed and photographed animals for a while, then began to follow a stream which wound its way through the foothills of the still-distant mountains. Here again we saw teeming life, this time in a pool. The creatures which threw their shadows on its sandy bottom were not fish, of course, but occupied the same ecological position as fish, and had the same problems; they were hunted.

The predator beast had fangs in his jaws and claws on his feet. He was only as large as the nut grazers, though small as he was he managed to look ferocious, even leonine, as he growled at us. We left him to his fishing and continued.

That night we camped in the foothills. Once again Casey pitched the tent. This time I was not content to bury myself in notebooks as I had the night before and retire early from the weariness of the journey. I had become acclimated to outdoor life and caught up in the spirit of the adventure. I was resolved to leave the recording of trivia to another day, and instead enjoy those things that made this journey personally memorable.

And so it was that I took over the task of cooking while Casey went to the stream for water. I sat by the fire and drank in the aroma of the food and the still, calm pleasure of Campbell's star-studded night.

Casey returned, looking troubled. At first he refused to tell me why. But I pestered him without mercy, and then he explained.

"It may mean nothing," he said. "But I found the remains of a fire."

He took me to it, and we examined it in torchlight, along the banks of the stream: charred lumps of wood, so tiny I could barely see them, scattered around and half-buried in the sand, meant something to him. I would never have noticed them, much less equated them with the presence of men, and did not understand his concern.

"So," I said, "other men have been here, made a fire. Why should this disturb you?"

"Because now I must search for their bones." He reached down and took an object from the sand, where it had been shallowly buried. He brushed away debris. It was the skull of one of the fish-like creatures, and it looked charred. "The creatures of this world are different from those of Earth. Some can be safely eaten, though they provide little nourishment and taste foul. Most are not safe. These are poisonous, yet it appears that they have been roasted and the flesh eaten."

"By whom? Surely if you know this, others do as well."

"Yes. It is common knowledge—now. So this must have been done by an early exploration party, dead before I came here. I know of no one missing from the station since then, and the signs are old. I will search again in the morning."

He did, but found nothing except more fishbones. That day I saw the grim side of Casey, for he was morose and troubled, as though he took this as a sign. And in truth it was, for us, as the first of the disasters struck us.

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Suddenly our dead reckoner became a dead dead reckoner. It refused to show our position on the console display, but meandered from one side of the screen to the other. We could get nothing but a feeble, anemic-looking blip that rolled around on the bottom of the screen.

"Can you repair it, Casey?"

His glance answered even before his words. "It is beyond my skill, even if I had parts and tools. We will have to work; use the satellite beacon and calculate our position from its next pass. I suggest we do not move until we have done that." He switched on the radio and punched the red button for the navigation channel.

We waited. The time came and went, but the beacon did not register as it overflew. Casey removed the cowling from the receiver; no easy task without proper tools. He looked into the works and sighed. "Fused. The tuner will not move. There has been a surge of some kind; an arc across the plates. They have been welded together. If I force them, the tuner will break. If I do not, we cannot match the satellite's frequency."

"What else do we have?" I asked him. I felt peculiarly helpless, since my education did not extend to such technical things, and I lacked the knowledge even to fully appreciate our predicament.

"Nothing. Not even a compass. Modern science replaced such things long ago with the contemptible gadgetry. I'm afraid we will have to resort to even more primitive methods."

"Can you find our way back to the station?"

"Certainly. To the east is the sea. We could hardly miss that, and once there we can follow the shoreline to the station. We are not in any danger of becoming lost, but I suggest we do not risk further problems by continuing inland. We should return at once."

Reluctantly I agreed. I was disappointed, but then, there was still plenty of time. We could get another skimmer and go out again, and this time we'd check it out carefully before we left.

Casey changed course, headed east, and carefully watched the skimmer's shadow on the ground below. He took what he hoped was the proper heading to get us near the station, holding a slight angle to the right and trying to compensate mentally for the passage of time. It was tedious work.

I left him alone, partly because I realized he was very busy and partly in reflection of my own disgust with this unhappy turn of events. I sat there, feeling the rush of the wind through my hair and listening to the steady hum of the fans.

I began hearing a click, at first barely audible, which grew louder as time went one.

Casey noticed it too, and cocked an ear to listen. There was a look of concern on his face, as though he anticipated more mechanical problems. Then the sound vanished, and Casey's look went with it.

After that we flew on at a steady speed of about forty-five knots for nearly two hours without a hint of what the mysterious noise had been. With their simple construction and controls, there was little that could go wrong with a skimmer, and neither of us then suspected the click represented anything

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more than a twig lodged in one of the fan grilles.

Then the escarpment appeared. It threatened to run for miles perpendicular to our path. To go around meant risking the loss of our orientation, human senses being as fallible as they are. Casey, therefore, decided to increase our altitude and climb it, and then to camp on the high plains for the night, which was rapidly approaching.

But as he increased power to gain the necessary lift, the click abruptly returned. It grew into a loud knock, and then a squeal joined it. Together they lapsed into a pounding vibration. I clung to the seat, fearful of being thrown out, for the skimmer had begun to list and pitch. Casey fought to control it, but could not stabilize us. In desperation, he cut the power and we dropped like a stone, our lifting surfaces inadequate to support us without the help of the fans.

Trees, in the path of our steep and rapid glide, plunged toward us. I could see Casey straining with the stick, trying to guide us toward the small clearing near the bend of the stream, but I knew we'd never make it. I was still watching in horror when the ground came up and we struck it with a glancing blow that jolted every bone in my body. We were sliding along the ground, striking bushes and rocks, a cloud of dust and debris rising around us. Then I felt myself being flung forward and knew I would hit the windscreen. Desperately I tried to duck.

Then I saw the stars and briefly tasted blood. After that came darkness.

I do not know how long my personal night lasted. I awoke to the real night, staring upward into Campbell's star-strewn sky and feeling wet and cold. There was pain, in my face and in my arms and legs. I could still taste blood, and a couple of my front teeth felt loose. But testing, I found my arms and legs seemed to work.

I strained to raise my head, felt a wave of pain, and dropped back into the coarse sand beneath me. I would have to try that a little slower. In the meantime, I looked around again, into the darkness, turning my head from side to side. There was little to be seen in the darkness except a glow on my right, toward a distant hilltop. As I watched, I could see it was creeping up the slope, and the realization came, aided by the acrid smell of smoke in the air, that it was a fire. And then it dawned on me that I didn't know where Casey was.

Ignoring the pain this time, I struggled to my feet, took an experimental step or two, and stumbled over something. I strained to see in the darkness of Campbell's moonless night. Below was a shapeless mass. Our tent? No, the satchel of supplies; some of it, anyway. It smelled funny, and I realized it had been burnt.

I groped at it, trying to find the opening and get a flashlight. That was when I heard Casey moan. He was underneath the bag, holding it with both arms. It was they, not the bag, which had been burnt.

I struggled with the bag, pulling it downward toward his feet, until at last it slipped off him. I opened it and searched frantically through its contents, until at last I found a shape that was right.

Pushing the switch brought forth a

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stabbing beam of light. In it I could see the burned stumps of trees, and the ground, covered with blackened ash. Grasses, still holding their living form, but now consisting only of fragile ash, disintegrated into little puffs as eddies of wind hit them.

I turned the light on Casey and gasped in horror. His fingers, at the ends of arms which still encircled the space the bag had occupied, were charred stumps. Above them, his arms were blistered horribly, and while the bag apparently had protected his upper chest and face, his hair hung loosely around his head, the braids singed off. There was a deep gash in his forehead, from which he'd apparently bled profusely. The blood had run down his neck and puddled darkly beneath his head.

The moan had told me Casey lived, and the sight told me how badly off he really was. There are few things more painful than burns, and fewer still more difficult to treat. And I knew that, in time, when the protective shock wore off, he would be suffering horribly, and I must then be ready to give him what help I could.

There was precious little in our bag of medical supplies. I searched through it and found nothing even remotely adequate. There was a tube of antiseptic jelly with which I coated the worst parts of his burnt arms and hands. But there were no large dressings, no unguents, and only three ampules of morphine sulfate to relieve his pain. These would not help for long. I decided to wait until his need was greatest before using this. I covered him with a blanket and sat down beside him to consider my own situation.

I was not badly hurt. I had only small bumps, cuts, and abrasions, and I had not been touched by the fire. From the looks of the front of my blouse, I had bled profusely from the nose, and while this was sore, it did not seem to be broken.

Alone, with the shock wearing off, I tried to piece things together. I knew what must have happened: the crash of the skimmer, into a rock or large tree, must have ruptured cells in its hull, shorting them out and setting fire to the underbrush. This would have melted other portions of the hull and started more fires.

I did not see the remains of the skimmer nearby; therefore I had been removed from the site, dunked in the stream, then placed here on the sand. Casey would have been all right then. And the fact that I had not been burned, or even singed, meant I had not come through the fire. That meant Casey had returned to the wreck to get the bag, and by that time the fire must have been fierce. He'd gotten his injuries retrieving the bag; but, I asked myself, why did he risk it?

Then I remembered: the native foods would not sustain human life. We needed terrestrial food. Without the skimmer, return to the settlement would take weeks; long enough so that we'd have risked starvation on the way. Casey knew we needed the bag to get back, that we were isolated and lost, with no expectancy of rescue. That's why he'd gone back.

I felt brief anger at him then, for sacrificing both of us. His male mind had told him he must save me by getting the food, but not that without him I had no

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hope whatsoever of making it. I knew that, and strangely enough it didn't bother me to know; not like it bothered me to have the responsibility for comforting Casey in what I realized would be his last hours.

As I sat there, all alone in the darkness, I realized I had absolutely no way of coping with a situation like this. I could only huddle here, wrapped in a blanket, and watch Casey's life pass away along with Campbell's night.

The shock wore off, fatigue marched in and took me away. For a time I slept. Then the rising sun woke me. It flooded in in all its brilliance through my closed eyelids. Opening them, I could see it was already at least an hour past dawn. I must be up, to see to Casey. I strained again to rise, and found that slumber had brought me stiffness to go with my pain. Every joint ached, every movement was agony; nevertheless I did gain my feet.

Around me, the blackened landscape loomed starkly. A hundred yards away the skimmer hung, its bow perched on the bole of a still-smouldering tree. Its skin had melted off in the fire, exposing the steel skeleton, now buckled and bent in the middle so that the stern rested flat on the ground.

Casey had not moved, and still lay, arms aloft, beneath the blanket. I could not tell if he was alive, and hesitated long moments before taking up the challenge and raising the blanket to look.

It would have shocked me less to find him dead, with his eyes closed. They were open. Incredibly, they moved. He was conscious, and remarkably, composed, and he seemed to have been waiting for me.

I gasped at the sight, and it was a moment before I found my voice. "Casey, I have the morphine. I'll give you some."

"No." His voice was strong. It was not consistent with the terrible pain I knew he must be experiencing. "Save it," he said. "I am in control." Then he closed his eyes.

He's delirious, I remember telling myself. I broke. I was not in control. "Casey! Your hands," I shouted. "There's nothing left of them. What are we going to do?"

The eyes opened, again calmly, to reassure me. Again he spoke strange words. "We will wait."

"Casey. We're lost, hundreds of miles from the station. Nobody knows we're here. I can't get us back. I can't even get myself back, much less move you."

"We will wait." His voice fairly boomed at me. "Set up the tent around me, then let me sleep. And wash that blood off your face. You look awful."

Again he closed his eyes, and again I was terrified. Was this merely the product of delirium, or was Casey some kind of superman, immune to pain? He looked so bad; yet he sounded so strong, so positive. For long moments I knelt there, bent over him, watching his chest rise and fall with deep, even breaths. Then I covered him again and went to do as he asked.

I washed away the blood, soaking a bandana in the cool water of the stream, so that I could go back and do the same for him.

I could not tell whether or not the strain was playing tricks with my imagination or whether I really saw what I

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thought I saw. But at the time he seemed a little more gaunt, a little thinner, than he had the day before. When I went to clean the dried blood from his face, the gash that had gaped at me so malignantly the night before now seemed tiny and insignificant.

I had to get hold of myself, curb my imagination; and nothing helps do that quite so well as work. So I pitched the tent: not so well as Casey would have, but adequately, then gathered wood and built a fire. I cooked and ate a light meal, then took the dishes to the stream to wash them, terrifying, in the process, the fish creatures which swam there, trapped in this oxbow pond.

Casey slumbered on inside the tent, oblivious of the awesome destruction his body had endured. He did not waken again, though I feared he would at any moment; that he would find his control gone and fearsome pain present, and I would need the morphine.

I pondered now his recovery, where short hours ago I had pondered his death. If he survived he would be helpless for weeks. I looked at the bag of supplies, which was by no means full, and wondered how we could stretch them out. We'd planned six days in the skimmer. On foot, it would be more like six weeks, if we could make it at all.

Time passed. I waited silently in the shade just inside the tent flap, and adjusted it from time to time to keep the sun off Casey. Campbell rotated in slightly more than nineteen standard hours. With next to no axial tilt there were roughly ten hours of daylight. As light began to ebb, I resolved the night would not be dark, and that this time the fire would be friendly.

Because of the destruction of vegetation in the area I had to go rather farther than usual to find wood, but I returned just as the light was about to fail, intending to check once more on Casey before it did. I dumped the wood on the ground and brushed off pieces of bark, then entered the tent and raised the blanket.

He did not stir, but appeared to be sleeping peacefully. Sometime during the day his arms had descended, and now rested across his chest beneath the blanket. Is it the light, I asked myself, or does he look yet thinner than he did before?

Over the bones of his face the skin stretched tight, and his cheeks seemed hollow. Then I glanced at his forehead. The gash had dwindled; shrunk, the way a healing cut does, to a fraction of its former size, as if days had passed instead of hours. This, I knew, was real. It was not a product of my mind. And I knew that what was real was in no way natural either, but I found my attitude about Casey's situation changing. It was not a question of if he recovered, but when.

Troubled by this perplexing fact and many others, I went outside and looked up into the night. Ahead and low on the horizon was the escarpment, which was probably the best reason I had to be pessimistic. We would have to climb it to reach the sea, and though Casey's miraculous slumber might eventually mend what was left of him, he might survive it merely to join me in starvation. The escarpment was our greatest obstacle, and we had met it at the worst time.

It seemed to stretch out endlessly in

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both directions. It was both steep and high. And what was nothing to a skimmer was unsurmountable to us now. No doubt along its course there existed breaches in its face, where a healthy person could climb up, and I could imagine myself struggling up some steep ravine, slipping on fallen rock and tearing at creepers for handholds. But Casey? No. His battered stumps of hands would be useless, and I simply lacked the strength to get him to the top.

I caught myself thinking, if only there was help; somebody else near that we could go to. A useless plea that flashed across my mind about the time I saw, or thought I saw, the fire up on top of the escarpment. Fire? Did I see it or did my need create its image? It was but a flicker, a pinpoint, that flashed across my retinas, then was gone.

I grew cold, and wrapped myself in a blanket. And creeping inside the tent, I lay at Casey's feet, staring at the flickering embers of our own fire. It had not occurred to me, as I fell asleep, that this, too, might be seen from far away.

Morning came. I rose with the sun, feeling somewhat less achey than I had the day before, and now resigned to what was to be. Casey slumbered on, looking even more skeletal, eyes now sunken in their sockets beneath dark lids. But the gash! The gash was gone! Not just diminished, but gone, without scab, without scar; not even a discoloration. I felt my blood run cold.

With shaking hands I grasped the blanket and drew it down, past his now-bony neck and across his chest. Through the unbuttoned shirt it, too, looked shallow, and where before thick muscles laced across it, ribs now pushed prominently through his skin.

And then I looked at his arms, which rested across his abdomen, expecting to see devastation, perhaps gangrene. Burnt skin had sloughed off and lay in flakes beneath them. Blisters had drained. In place of blackened ruin now appeared smooth pink skin, devoid of any scarring.

Reason told me this could not be; that it was in my mind the fantasy lay. But even as I gazed in disbelief my eyes dropped to his hands, no longer charred and cracking, oozing fluid and dripping life away, bare stumps of useless tortured flesh. A scream rose in my throat, which at the last minute I stifled, while blood thumped a fierce tattoo and went pounding across my temples.

The hands were whole, smooth and pink, lacking only nails, and at the fingertips these, too, were budding. I dropped the blanket and knelt there, over this strange new Casey, reflecting on what I'd just seen, convinced it was not real. Then I wondered: did fantasy deceive touch, as it did the eyes? And some insane curiosity impelled me to reach out. I felt, not charred and hardened ruin, but firm warm flesh, and a pulse, faint, but regular. This time the scream came, shrill and piercing, and echoed down the valley.

Casey stirred. He opened his eyes and smiled weakly, totally obliterating the demonic picture of him that had been forming in my mind, becoming once again only a man. I lost my fear and again I knelt beside him, holding his hand, waiting for him to gain the strength to speak. Whatever sort of mir-

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acle was taking place, I was now grateful.

Presently his lips began to move. At first no sound came out, but I bent near and strained to hear, and at last he became audible.

"I have control," he said. "I have rebuilt; replaced the damaged tissue. But my body's reserves are gone; used up. They now must be replaced. Help me."

He referred, of course, to his emaciated condition. Somehow he had moved tissue into the wounded parts, perhaps at great peril to his system as a whole, and it was this he wanted to protect now. But what was it he wanted me to do?

"How, Casey? Tell me how."

"I need protein; lots of it. I must eat meat."

I started to rise. "I'll get it for you, Casey."

But he held tightly to my hand. "No," he said, "Not from the supplies. Those are for you. You need them."

"Where, then?"

"From the stream. There is food in the stream."

"The fish? But you said they were poisonous." I knelt again, still holding his hand.

"To you; not to me. I can metabolize them; make the poisons harmless. You cannot. Listen to me; you have seen that I am different. Now, do as I ask."

Weak though his voice was, its tone was commanding, and I went down to the stream, to trap the fish creatures imprisoned in the pond. Some spare clothing and a length of springy root became a net, with which I hurled the helpless creatures up on shore until I had all of them the pool contained. Then, with my hands, I dug a passage through the soft mud and sand, so more could enter from the stream.

They smelled terrible, cooking on the spit. I did not know how to clean them. Casey seemed not to mind but ate every bit I fed him. Throughout the day he ate all I could catch, interrupting his disgusting repast with catnaps in between.

By nightfall he had gained strength to the point where he could sit up. "Tomorrow," he said, "I shall hunt."

I had not troubled him with questions throughout the long day. In truth, I lacked sufficient insight to ask anything meaningful. I knew only that he was a most extraordinary man, if that was in fact his nature; that the experience I was having was unique to human memory. When the sun set, I fell asleep, still wondering whether this was real or a dream.

I rose late, with the sun high outside the tent and Casey gone. I found him outside, transformed. Still thin, still gaunt, but looking fit and now whole, he stood there, moccasins of deerskin on his feet, a deerskin loincloth spanning lithe hips. His hair, now too short to braid, was bound with a strip of cloth. These had come, no doubt, from the depths of the battered duffle bag, along with the curious necklace that now hung across his chest.

He saw me look at that.

"Serpents' teeth," he said, "for luck. One of my talismans. We can use some good luck for a change."

"I hope so," I said. "So far, it's all been bad."

Casey was fashioning a javelin of sorts, using a stick and a sharpened tent peg. "Luck," he said, "had nothing to

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do with our misfortunes. It was sabotage."

I stared at him for long moments, finally finding voice. "But how, and who?"

"As to the instruments, I cannot say for sure. The fire left little trace of them. But I found the fan-bearing housings full of emery, and that is why they failed."

"But who? Who would want us dead?"

"Not us; you. I am nothing to them, whoever they are. You menace someone at the station. Compelled to guess, I would say they fear your mission here is to discover something which will deny them this world."

"What? Certainly I've yet found nothing which would require that, unless . . ." The thought came to me. "Casey, how long have you been on Campbell?"

"About three years; since the first crews came."

"And you've traveled about?"

"Some, though never this far from the sea."

"Have you seen, or heard rumors of, any advanced life forms here?"

"No, I never have. Why do you ask?"

"Because," I said, still not sure I had not dreamed it, "the other night I thought I saw a fire, out on the escarpment."

"Perhaps you did. Maybe it was a search party, looking for us."

"But they don't know we're lost. We're not overdue yet. And why, if they were men, have they not yet come to us? Perhaps they are not men. This is a big world. And, unlikely though it seems, considering the low order of life the planet seems to support, it is not impossible that intelligence arose here. Making, even using, fire requires intelligence of a relatively high order. Certainly well beyond anything we've yet encountered. And," I added, "the existence of native intelligent life is an eminently good reason to kill me. The planet would belong to them. Solar Minerals would be out on its neck."

"Show me where you saw the fire, Kim."

I pointed with reasonable certainty toward the escarpment. *Had he used my first name?* "It's there," I said, "where the dark streak is."

"Then we shall go that way. Now, eat, while I prepare packs. I am afraid we must abandon the tent and the less useful equipment, to travel light."

All day we trekked across the scrublands, which lay between the foothills and the escarpment. Our goal was the escarpment's base, and it was deceptively distant. The going was difficult; our passage was hindered by heavy brush and gulleys strewn with rocks. When at last we stopped, to camp by a small stream, Casey would not allow a fire. We ate cold food, and after that Casey went to work, fashioning snares of tent cordage and setting them by the water.

When the sun set we lay in darkness, huddled together under blankets. Though exhausted, I could not sleep, but lay there wondering if, even with his marvelous skill at woodsmanship, we'd ever make it back to the sea. More than that, I believed that now I could summon the nerve to ask the question which had nagged at me since the crash; a question I had been afraid to ask, be-

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cause I did not know if I could live with the answer if I got one.

So, following my impulse and without further reflection, I blurted it out, and it raced past my lips too fast for anything to stop it. "What are you, Casey?" *There, I'd done it.*

He did not answer at once, but paused, and sighed. "I am Kah-si-omah; He Who Waits, in the tongue of my fathers."

I rose on my left elbow, and faced him. "No," I said. "Not who; *what* are you, Casey? You know what I mean. You owe me a truthful answer."

Again he paused, as if deliberating whether or not to say anything at all. Again came the sign. "This is true, Kim. I do indeed owe you that. But I fear what you ask is unanswerable. I have myself asked the same question too often to remember."

I was becoming angry now, finding courage in my impatience. "Don't try riddles with me, Casey. You aren't, and never were, the dumb Indian you pretend to be, though you play the part to perfection. Admit it: you're more than human; now tell me truthfully: what are you?"

He protested my anger. His answer rang with sadness all the same, and there was a curious cracking in his voice. "In truth, I do not know what I am, or even exactly how I came to be. I can only tell you this; if I am no longer a man, I once was, long ago. I have lived a very long time already. I may never be able to die, however much I may wish to."

A horrible thought struck me. "The fish, Casey! Did you eat them to poison yourself, so you could die?" I pictured myself alone, beside his rotting corpse.

"No, Kim. I ate them for strength, knowing they could not harm me. I desperately wanted to live because you needed me."

I felt ashamed at this and spoke no more, but Casey, having started, was constrained to continue, as though it meant something special to him to explain; to have someone share.

"I have done this before," he said. "Some believed me and some did not. I have shared this tale of grief with other friends, only to watch them age and wither away; to leave me in death, all alone, separated from all others by the cruelest of all barriers: time. I am trapped in an eternal present."

His voice took on plaintive tones. There was a great sorrow in it, and a touch of frustration he tried very hard to subdue. "I have tried many lives, and been many things in the time I have already lived. In the beginning I was most assuredly a man, with all a man's infirmities. I grew old as a man, then suddenly I was young again, and have remained so ever since, though I can take the appearance of age or any other feature of man whenever it suits me.

"I was a shaman of the *people*; a medicine man. This I remember, as I remember all that happened before, and all that happened since the vision which changed me. I had gone to the mountaintop to fast, in hopes that the spirits would speak to me. For many days and nights I waited, and they were silent. Then I took the cup; the spirit of the sacred mushroom steeped in water. It is hallucinogenic, which compounds the mystery of my transformation, since I

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could not tell what was fact and what was fantasy. I have a memory of an awesome flame and terrible burning pain, then of a satisfying inner peace such as no other I have ever known. I believed at the time that I had been with God.

"When the vision began, I was an old man, perhaps sixty, or older. The *people* had no accurate way of reckoning time, but in my calling age was much revered. When I awoke I was much as you see me now, and the *people* did not know me, though I told them I was Kah-sih-omah. My wife and children denied me. To them I was a stranger who had come upon cherished family secrets through magic and overcome Kah-sih-omah. I had his medicine bundle, therefore I was more powerful than he, potent though he was. And in superstitious fear they drove me away with threats of death.

"I did not know then of my immortality. I still feared death.

"I wandered the land as an outcast, perhaps for millennia, certainly for many centuries. I found that within certain relatively broad limits I could control both my form and my features, though radical charges were onerous and required enormous concentration to hold. Minor changes became habitual and required next to no effort; therefore I could adapt to any tribe and live among them, learn their tongue and customs and be as they were, until they noticed I did not grow old. I rarely remained that long in any one place, and so, in time, I had no identity. And as time changes men, so also does it change cultures. Even the *people* lost their identity in the time I had lived.

"When I was young, mammoths roamed the Americas. By the time they passed, I was already intimate with both continents and with those who lived upon them. I conversed with each in his own tongue and believed at the time this was all there was to the world.

"Then I learned of great, fierce strangers who visited the far north. Great hulking Vikings with pale skin and hair on their faces, who used weapons and implements of iron brought from lands beyond the eastern sea. I went north, becoming as they were, and lived among them. But they found the land too harsh and the distance too great. When they sailed away, I went with them.

"It was in Europe where I began to really understand my plight, for the Europeans possessed a true conception of the passage of time. Here too, I made my first acquaintance with the messianic redemptionist religions of the Middle East. It was an era of foment. Islam and Christendom fought each other on the battlefields, each claiming true insight into the destiny of man.

"I had to know my reason to be. For a time I believed the answer lay in the East, and I went there, seeking to find the purpose my existence served, to end the boredom of useless existence. Still none could, or would, tell me. I began to regard what answers they gave as purely parochial. They were seers, such as I had been, whose movements had acquired the trappings of cults and mired themselves in mindless dogma. I knew well the ways of the wizards. I understood their motives and how wily, indolent men sometimes corrupt a noble

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concept, using knowledge to acquire wealth and power.

"I wanted none of these, so I abandoned them and traveled on, to India. There, despite more mountains of superstitious nonsense, I remained a century or two and sifted through it, finding much which was good. I found, not an answer, but an aid: a truly realistic concept of the vastness of time, that contemplated both a beginning and an end.

"And then I knew I was not truly immortal; that I would someday end, if not with death of Earth, then with the death of the universe. I knew also that, while life was finite after all, it would yet seem infinite to me, and yet, in that infinity—somewhere, out of sight and understanding, to be revealed to me someday—I had a purpose.

"So I wait, as I have for centuries, for my sign, preparing myself as best I can for what must come. Now I know my destiny approaches, but it is a lonely wait."

Then, Casey spoke no more. I huddled near him, to comfort him. Though I was but an infinitesimal fraction of what he was, he took it, and for a while the loneliness we both felt ebbed, and was for a time forgotten.

With daylight we could risk a fire. I was kindling one when Casey returned from checking snares. He carried one of the nut creatures, and the head of his javelin was stained with its blood.

He plunged the javelin into the ground, where it would be handy, and set about skinning the animal with one of the mess kit's knives. Though he had talked a great deal the night before, he was strangely silent now. He finished the flaying, spitted the carcass over the fire, and took its entrails down to the stream to wash them. At the time I thought perhaps he now regretted baring his soul to me.

He returned, bearing a glazed mass, which he stuffed into a plastic jar and liberally salted. Then he took the spit from me, turning it slowly until the meat turned uniformly brown and began to crackle, dripping melted fat into the fire.

I watched him tear off a small fragment and chew it carefully. Then he swallowed it and said, "You may safely eat this. Your body will make use of little of it, but it will not harm you, and it is filling. We must now use all the land will give us, if we are ever to reach the station."

Strange words, I thought. His voice carried foreboding, but I did not pry. I knew now that Casey revealed himself in his own good time and at his own pace. I ate what he gave me, and it was good.

Then, while I broke camp, Casey scraped and salted the animal's hide. He rolled it up and tied it with a thong. "Come," he said, picking up his pack and javelin. Then he walked off in the direction of the wrecked skimmer.

"Casey! That's the wrong direction." I was mystified.

"I know, but come with me. I must show you something."

I followed him, sensing his disturbance, all the way to the stream, where we came to an area of packed sand.

He stopped and pointed down. "Look," he said, pointing to tracks in the sand. "Something stalks us."

Fear washed over me. "What—who?"

"I do not know. It is not human, but

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it is not a beast, either. I had four snares. All caught game, but three were raided. Only that closest to our fire was undisturbed."

"Maybe another animal . . ."

"No. Animals bite or break the cord. They do not untie the knots. They kill with teeth or claws, not clubs. The thief had a stone ax. He put it on the ground while he took our game. He stepped on it, leaving its impression on the sand. There are the thongs binding head to haft. Observe this footprint, this foot was not bare. It was covered. When the creature knelt on one knee, it did not mark the ground with toes."

I tried my best to see what he saw, but even with his explanation this was not easy. But then, he had been here before and had had time to think about an explanation, and if he thought the thief had not been human, I wanted to know why.

"There are other tracks, farther along. They are in soft mud and bear impressions well. And the shape and size of the foot is wrong. So is its articulation. There is no arch, and the foot that made the tracks did not bend in the manner of the human foot. The creature's strides are impossibly long, suggesting a giant, yet it is also impossibly light. There are other signs, less visible but equally informative. We are fortunate that there was only one of them."

"So Campbell has sapients. And Solar Minerals knew it. You were right about them wanting me dead."

"It would seem so. But now we face new danger; more enemies. That is why I must now make weapons and why I may again have to kill, loath as I am to do so. But come, we must travel. We can learn nothing more here."

Throughout the day we walked steadily. I found myself taking frequent nervous glances behind, searching the underbrush for signs of the tall creature. Once or twice I thought I saw something, but Casey assured me there was no cause for alarm.

From time to time he stopped and picked rocks from the ground, slipping them into his pack. Once, while I rested, he went off into the bush and cut a stave. Later, as we walked, he whittled on it, and I wondered why. The stave took on form and symmetry, becoming a bow before my eyes.

We camped that night at the base of the escarpment, taking shelter in a shallow cave, from whose entrance Casey labored long to erase our spoor. Again we ate cold food, afraid to risk a fire. "Tomorrow," Casey said, "we shall be armed, and make preparation for the climb."

I lolled around the next day watching Casey's wizardry with the rocks he had collected. Pressing shards against a bit of bone, he fractured and shaped them with consummate skill into dozens of exquisitely formed arrowheads. Then, with enough of these, he ventured out to cut quills, which peeled, split, and notched, and winged with bits of plastic, became the shafts of his arrows. Their heads he bound on with twisted strips of wet gut taken from the animal in the snare. Other strips, tightly twisted, became the bowstring, and sewed the seams of the quiver he made from the salted hide. As the thong dried, it bound tightly whatever it encircled; such was Casey's skill in the wild.

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That night I fell asleep in his arms, confident, as the light died, that I was safe with a protector far better armed than any enemy who stalked us.

Later on we met the enemy, there in the dark hollowness of the cavern. I was thrown suddenly aside, awakened by a scream never uttered through a human throat. I crawled away from thrashing feet and grabbed a torch from my pack; then flashed its light around the cave.

Casey struggled with a gangling giant, who reached nearly to the top of the cavern. In one of the creature's hands was a stone ax; in the other, Casey's throat.

Casey held back the ax arm with one hand. With the other he lashed out. His enemy was mighty and determined, and was pushing Casey back toward the wall, though Casey's muscles strained and knotted in resistance. His feet left furrows in the cave's sandy floor as he was forced to give way.

I jumped to my feet, side-stepping them, and they struggled past me. I flashed the light around the cave, fearing other enemies might be about to enter and trying to think of something I could do to help. Casey was no weakling, but he had not yet recovered his full strength.

There in the corner stood the bow and quiver, which I lacked the skill to use. But there also, stuck in the sand, was the javelin. I ran to it and pulled it free just as a strange sound struck my ears. I flashed the light at the wall. Casey's opponent had kicked his feet from under him, and the sound had come from his head hitting the wall.

The light momentarily distracted the creature. It turned to look at me. For the instant I froze in my tracks as that face inspired pure terror in me, but when it turned its attention back on Casey I knew what I had to do; I brought up the javelin and thrust its head deep into the middle of the creature's back.

There was another blood-curdling scream, but it lasted only an instant. Before my eyes and in the torchlight the being literally wilted. A torrent of orange-pink fluid poured from its wound onto the cave floor. It seemed to collapse in sections, like a beach toy deflating. The ax clattered to the ground.

Casey scrambled to his feet. He seized the torch from me and held it on the dying alien, now curiously flattened on the floor of the cave and growing even flatter with each passing moment. My nerve broke. I sank to my knees and broke into tears. Casey moved to console me. I struggled for a time to speak, and found words difficult to come by. When they did come they were in broken gasps. "Casey—uh—what is that thing?"

"It is the being who raided our snares, I would guess. It has been tracking us, presumably with this." He pointed to its long snout. "Such noses are found on all earthly creatures with acute sense of smell. I wish you had not killed it."

I suddenly felt hurt; defensive. "But you were losing, Casey. I had to do something."

"Its anatomy was strange to me. I needed time to find its vulnerabilities, so I retreated to the wall to explore it. Despite its size, it is far weaker than a man. You will perceive it has no bones."

"No bones," I screamed in disbelief.

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"It lacks a rigid skeleton on which to anchor muscles, therefore it has great resilience but little strength. That is the reason it died so swiftly once punctured with a deep wound. The fluids expelled were under considerable pressure to hold it rigid, but once released, its form collapsed. Probably it suffocated. I will know in the morning when light permits dissection. That should be facinating."

I was horrified. "Dissection! I can't stand to look at it now. How can you be so morbid?"

He placed his hand on my shoulder and helped me to my feet. "I have been many things in my long past, Kim, including on many occasions a physician. I was at Waterloo, for instance, and at Gettysburg and Iwo Jima. I was there because while I could not confer my own invulnerability, I could ease pain. I learned from those experiences as I will from this. Perhaps I may even learn how to avoid killing any more of these creatures, should we be attacked again."

"I don't want to meet any more of them." I shuddered at the thought.

Casey's answer was firm and resolute. "Nor do I," he said. "But if we do, I do not intend to take another life. My own may be safe, but that of others is so transitory it is by comparison that much more sacred to me."

I slept no more that night, but huddled in my blanket waiting for dawn. When it came, I avoided Casey. This was illogical, and I knew it. What he said had been true, and his grisly work was necessary, but I waited outside the cave while he did it.

When finally he joined me he was grim and he seemed puzzled, though not disposed to explain why. I packed, while he buried the creature's body in the woods beneath a pile of stones and marked the spot with the stone ax.

We started out, walking silently along the base of the escarpment, searching for a path to the top. Presently we came upon a promising ravine, through which trickled the waters of a small stream. We climbed its slippery rocks as far as the cataract, which fell near its summit. There we rested, and drank. I bathed my aching feet in the cool waters of the cataract's pool while Casey kept his bow ready and his eyes on the rim.

Finally I could endure silence no longer, and I asked him, point blank: "What disturbs you, Casey? What did you find?"

"I found many things, Kim. All of them strange, most unfathomable. The alien's limbs bore marks on what would be wrists and ankles were it human. I have seen such marks before, on the bodies of slaves. Manacles and leg irons make them. These were fresh."

I pondered this remark. Casey seemed so sure. "Slavery," I said, "is not new to human culture. It existed on Earth into the last century. I am shocked to find such evidence here on Campbell, where higher life is supposed not to exist at all, but what bothers me more is the possibility that Solar Minerals . . ."

"No." Casey had never interruped me before. He did now. "Solar Minerals has no slaves. They may know of the creatures' existence; they may have suppressed that knowledge, but nothing more. That I know for sure.

"The alien you killed was not a native form. It did not evolve here. There are no anatomical parallels with Campbell's

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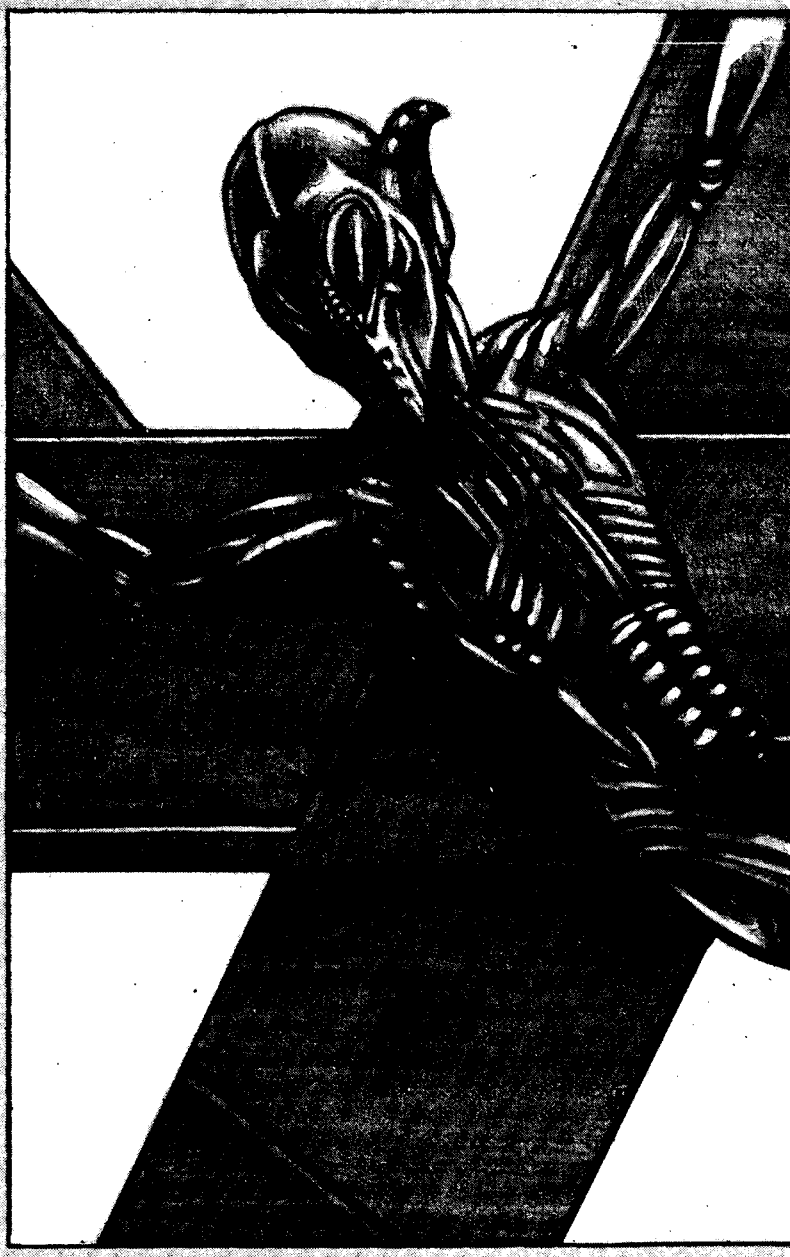

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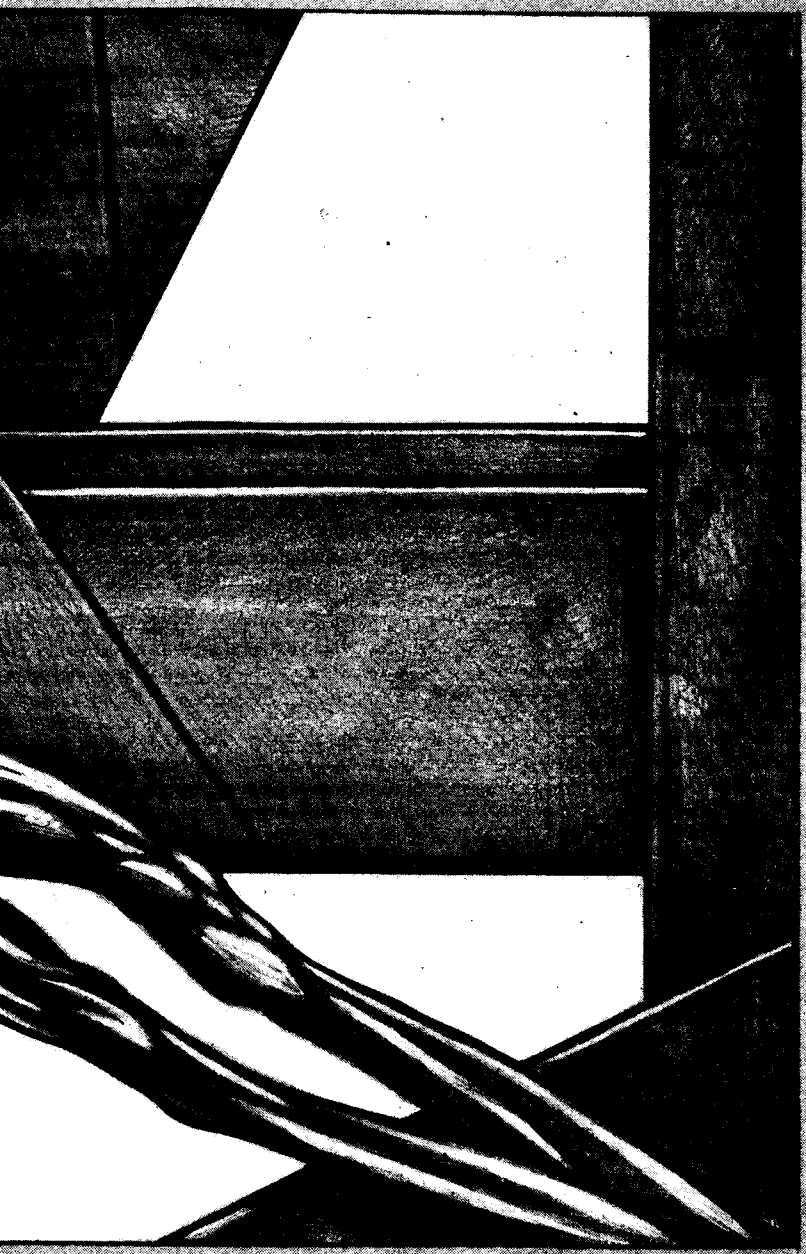

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other life. It is grossly unrelated to them. It is, like us, an alien."

He paused a moment to let that sink in, then continued. "There is more. That creature, at least, has been here very briefly. I examined its dentation. In the past it has had caries, and these have been repaired with skill few human dentists could match. I found a stainless steel bridge, which implies a very high order of technology, yet the creature was armed with a stone ax *Homo erectus* would have been ashamed to carry. Why?"

I did not know, but the implication sent shivers through me. Suddenly I felt cold and pulled my feet from the water. But the chill was not in the water; it was in my mind. If felt uncomfortable here. "Can we go, Casey?"

He was willing, and we started out. At the top of the escarpment we found flat land, thickly forested. The proto-grasses grew profusely between the clumps of trees, but the bushes were sparse, which made easy travel. The grass was high enough to almost conceal herds of the little grazers, and from time to time we would flush a group of them by stumbling into their hiding places. Toward the end of the day Casey shot two of them; more than we really needed for food, but as he pointed out, I was rapidly tearing my clothing to tatters, struggling through the bush. And while not deerskin, and though it promised to be malodorous for want of adequate curing, it was all we had.

I was reassured, watching this demonstration of his skill with the bow: sure, swift shots that never missed. Less reassuring was the fact that now he kept it always at the ready, while I fell heir to the less complicated javelin, and held it ever tighter.

We stopped well before sundown that night, so that we could have a fire and cook the meat before darkness fell.

Casey picked a thorny thicket and plugged its entrances with branches. "If we have visitors tonight," he said, "they will have to pass slowly through this. I only hope the wood is too green for them to burn us out. The spoor I have seen nearby is old, but it is best to use care."

Spoor, I thought. So there was more alien activity in the area. He knew but hadn't told me. Again I spent an uncomfortable night, awaking to a dawn that promised even more danger.

Again we set out in the direction of the rising sun. Long shadows shrank like the dew as the sun cleared the tree tops and pounded down on us, bringing us yet another enigma.

Casey noticed it first, of course. His impulse was to give it wide berth and hope I missed it. I didn't. "What is it, Casey?"

Caught at deception, he owned up. "A building, I think. I cannot see it all. Parts are hidden by the trees, though it is, undoubtedly, artificial. I am reasonably certain men did not put it there. That leaves the aliens, whose signs abound." Then, as if to forestall alarm in me, he added, "Old signs, though. None have passed this way in recent days."

It lay across our course, and there no longer being any reason not to approach it, we did so carefully, stopping about 500 yards away. At this distance its surface was clearly visible. It gleamed in off-white brilliance, standing about three

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times man-height, with a base of about the same diameter. Concentric stone disks about a foot thick made up its layers, the largest at the bottom. A man would have been hard pressed to stand on the tiny disc at the apex. We could not tell if these were molded or stacked. But if stacked, the seams were undetectable.

We went nearer and circled it. Casey studied the ground, found nothing recent enough to bother him, then motioned me to come closer.

"It's just a stack of stone steps, Casey. Out here in the middle of nowhere. Why?"

"I cannot even make a conjecture. I can tell you more aliens exist; perhaps more than one kind. I can detect impressions of three distinct shapes and sizes of feet. One fits our dead alien, one is hooflike, and the third is human. All are old and faint."

"Human! Then Solar does know there is a connection."

"They know of the structure." He bent down and walked around it, surveying its base, then picked something up. "Paper fragments, charred and faded. Very old." He stopped again.

This time the retrieved object was larger. He held it to his nose and sniffed.

"What have you found, Casey?"

"Men have been here. One of them smoked cigars. This is tobacco leaf. The paper fragments came from the wrapping of half-pound blocks of nitrostarch, such as we use for blasting. They have tested the strength of this edifice, or perhaps tried to obtain a sample of it. The blast discolored it, nothing more, but the grass and ground yielded though the stone did not." He pointed.

"Newer growth, though still weeks old, perhaps a couple of months old. They knew long before you came. I think this area merits further exploration."

He turned and started off, eyes on the ground, stepping carefully. I walked behind and waited for him to tell me what I saw. None of it meant anything to me, but I knew he was following tracks of some sort. They led out of one grove and into another. Casey's paced quickened.

Once within it he again bent down; began picking up bones, dried and bleached, which looked to me to be the same as those from animals we ate. Farther in there was a firepit, edged with stones and littered with more bones.

"The remains of feasts, Kim. Some old, some relatively recent. Some of the parties were large. The last consisted of ten or twelve individuals."

"Men or aliens?" I asked.

"Aliens. I can find no useful tracks among these leaves, but men would leave distinctive signs. And men have metal implements. What ate here had not even flint knives, but only axes, crudely made of stone. Observe the fragments in the fire: seasoned wood was broken, green wood only was cut, because stone blades can handle that. Bones were smashed at the joints, then twisted loose, a somewhat messy, inefficient process compared to cutting.

"And I have noticed something else about this place. I did not climb the structure, therefore I missed it before, but look at this."

He led me to a large, flat, oblong stone set in the ground, obscured by grass. Behind it, in a line leading to the

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structure, were others. "A marked path, visible from the top of the structure, but barely noticeable from the ground. Note the stones are not dressed, but natural, though carefully selected. The builders of the structure did not lay them; the diners did. Neither work has been here very long."

"How do you know?"

"The bushes tell me. Outside a fifty-or-so-foot circle many large ones grow, but few grow inside and they are small. And the grasses within are thinner. They grow in soil recently disturbed to a considerable depth, and therefore poor in nutrients. But come, let us continue."

I followed him around, while he searched for obscure things I would not have dreamed bore information. The signs led him to another stone. Again it was flat, and very large, sunk deep into the ground and partially covered with leaves. On its face, crudely scratched in the soft limestone, were several lines of symbols, each rubbed with some kind of clay to give it contrast with the rest of the rock.

"Writing," Casey said. "Several different languages, too, I'd say. And far from primitive."

"You can read it?" I asked incredulously.

"Of course not. Even so, there is much it tells me. I am familiar with most human script. Writing begins with pictograms. Stylized symbols follow, then true alphabets. Alphabets are refined. Their use demands extreme abstraction of thought. Being so fundamental, their symbols are repetitious; economical. Alphabets do not occur in non-technical civilizations. Certainly no human writing system predates the use of metals."

"Which means?" I wondered if he himself really knew.

"The primitive tools are an expedient to the people who carved this stone, used because better ones demand technology they don't have. They cannot even shape flint decently."

"Perhaps they did not come here purposely, Casey, but were shipwrecked. Perhaps the structure is for signalling."

He did not agree. "I think not, but I have no better explanation. However, the writing clearly conveys a message; the intention of the writers is also clear: it is to be seen by someone on top of the structure. The writer intends that the reader first ascend. What intrigues me is why."

"Perhaps the structure is a monument."

"If so, it is poorly placed, hidden in the grove."

For the rest of the morning we explored the area around the structure. Casey found much to indicate heavy past traffic through the woods, but nothing that would tell him why. But from the signs he saw he concluded the beings came and went from some location to the east. There was a fairly well worn path in that direction.

We, too, set off to the east, but kept to a nearby ridge which ran parallel, not wishing chance encounters. The difficult ground and the need for stealth made the traveling slower, so we had gotten only about a quarter of a mile when Casey suddenly stopped.

His reason was not apparent to me. "What is it, Casey?" I asked.

"A strange sensation. I feel peculiar." He looked down at his arm. His sparse hairs were twitching. Then I saw

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the hair on his head beneath the band move and stand out. I felt my own hair rise like a wreath around my head.

"Some kind of electrostatic field," Casey said. "Let's get off this ridge."

I looked up at the sky. It was cloudless, so it was not an electrical storm that was producing the effect. Nevertheless I followed Casey to lower ground. A noise began: a hiss, then a crackle. It came from behind us, in the direction of the structure. We could see only the top of this. It was glowing.

Soon it was brighter than the sun. The air around it shimmered and the noise rose in both amplitude and pitch. An object, dark by comparison, appeared atop the structure, at first indistinct but rapidly gathering form. It became a great cross; then, as we watched, the image changed, and became a figure with outstretched arms. Abruptly the hissing died down, and the figure dropped its arms to its sides. Then it ran down the tiers and disappeared from sight.

Again the hiss grew; the structure glowed. In the same manner as before a being appeared, then fled the pinnacle. Six more times the episode was repeated. Then the glow died.

I broke our long silence. "Well," I said. "Now we know how they got here. It's some kind of matter transmitter. The next question is why. How can we reconcile this with stone axes?

"We can't, Kim," he answered gravely. "Not without revising our previous speculation. I have the beginning of a hypothesis, but I want to see what happens next before explaining. Let's get up on the ridge where we can watch the trail. Be very quiet."

I followed him to the crest, where we could see in both directions for nearly five hundred yards.

He took note of the direction of the wind and notched an arrow to his bow. "We are downwind," he said, "and thus may not be noticed."

About ten minutes later forms appeared, heading west. There were four of them, all carrying axes. The two in front were the tall boneless kind. Those behind, and having difficulty keeping up, were short, thick, heavily muscled creatures with hoofed feet. They passed without noticing us.

Twenty minutes or so later six of each passed in the opposite direction, but the newcomers had no weapons.

Casey waited until they were well ahead of us, then motioned me to follow him along the ridge. "I think I know now where we are," he said.

"Another riddle, Casey? Where are we?"

"This is Devil's Island; a penal colony, like the one the French used to have in South America. I believe this is where the aliens send criminals, and I think that is what those creatures are. Whoever sends them doesn't know humans have come here. Probably they never visit. There would be no reason for it."

I didn't understand, and said so.

Casey explained his theory. "It fits the facts we have. Consider: these beings possess nothing not obtainable here; not even clothing, if they wear it. This is not compatible with a colonizing or commercial venture, nor with an invasion force, given the means they have of transporting material things of great size.

"Also, note the condition of arrival.

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The subjects are restrained on crosses. Released, they run and disappear. This may, of course, be necessary to transmission, but I find another possibility more likely; they are restrained because they would otherwise resist. They are freed only when safely trapped here. And they are not slaves as I once supposed, since slaves are useful only when they can be worked.

"But the best support of the convict theory was found on the dead one. He got adequate but cheap dental care; stainless steel instead of gold, porcelain, or silver alloy. It smacks of institutional dentistry; the sort, perhaps, that he'd get from another inmate who had lots of time on his hands and who employed great skill and patience in the job, but who couldn't get his hands on really first-class materials. The convict dentist's talent shows in the humbler medium, just as the skill of early American goldsmiths showed in the pewter they sometimes substituted when gold was too scarce and too dear.

"Then there are the old signs of turmoil I found at the structure. The first arrivals probably battled one another, then gradually saw that this was foolish and began cooperating. Later they probably organized into some loose form of government and made the guide marker and stone plaque. I think the feasts took place at an earlier time, when they stayed near the structure. Then, as their numbers increased, they hunted the area bare, and had to leave. They probably made the plaque then."

"It sounds reasonable, Casey," I said. "But then, so does everything else you say. I am amazed you learn so much from a few simple signs that I don't even notice. Tell me, what have you thought it means for us?"

Casey looked at me and smiled. He was obviously proud of his powers of observation and deduction. "Some look," he said, "others see. If asked to speculate—and I have been—I would conclude, as I have said, the makers do not suspect the presence of men here. Perhaps long ago they sent a ship here to build this station, and possibly others elsewhere on the planet, though I think this unlikely. Perhaps they send only a few convicts here, and it may therefore have been a long time since they built the structure.

"In the interim, humans came, and the convicts have not molested them, though I believe they know of us. Perhaps promiscuous attack is discouraged by our relatively great numbers and their knowledge that we possess better arms and explosives.

"In any event, I have heard no rumors among the men concerning aliens. It may be therefore that, while management knows of the structure, they think it is sessile."

The impact of that settled on me. It meant we would now be hunted by both groups.

But Casey reassured me. "I think the alien you killed was a scout, who did not get back to report. Perhaps he saw the forest fire and surmised a skimmer crash. The fire would have been visible for great distances, particularly from atop the escarpment, and the wreck would have represented a valuable source of metal for making tools and weapons.

"He arrived, perhaps, the day we left the site, but dared not attack us then. Instead he followed us to the cave, as-

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suming we would be taken more easily while asleep. He was, therefore, alone at that time, though others may have followed. That, too, is unlikely, since we had much of value to him and he took nothing. If he were part of a group he would have selected choice objects for himself. Since he did not, he counted on retrieving them later. Therefore, he was alone."

"That," I said, "is bad enough, even with only half the planetary population against me. I have a real talent for finding trouble, don't I? What am I going to do?"

"The situation would seem to call for skillful diplomacy, Kim. I was about to ask you that question."

"Well, this is obviously going to change Campbell's whole history. I'll have to report the situation as soon as I can, whether Solar Minerals likes it or not, and let the U.N. handle it."

"That is plainly the proper course. The method, however, is critical. This is not a situation of indigenous life having a primary claim; it is a question of who has a better discovery claim. Solar will adopt that position if discovered. I would: and I know something of law, having been a lawyer at various times during my existence.

"However, I have been a human being for longer and, I hope, a sensible one. It does not seem sensible to me for you to mention any of this to Solar's local management. Remember, we are 114 light years from Earth. The *Wilmington* is our only contact, and it is under their charter. You have a four-month wait until the ship returns, and fifty-two days in space."

"I don't think I can keep the secret that long, Casey."

"You must. Meyers condoned, if he did not order, one attempt to kill you. When they discover their failure there will be another try, unless in the meantime you prove yourself innocuous."

"Why can't we just hide out in the woods until the ship comes?"

"You would starve. I can exist on native foods; you can't. You need Earthly nourishment, and what we brought will not last you."

"So I have to cook up a story, leaving the part about the beasties out of it?"

"It is the only way. You may not succeed in convincing Meyers you are not a danger to him, but it is less likely he will try to harm you at the station with so many others around. And he will have no way of knowing for sure that you have knowledge of the aliens."

I deliberated.

Casey went on. "You have certainly seen enough to make a judgment and complete your survey; you will not have to go out again."

That was true enough, I thought. But I said, "What about you, Casey? You're in it, too. And you can't run like I will."

"Do not worry," he told me. "I'm just a dumb Indian, with more luck than brains. They know I'm too slow-witted to be trouble. Besides, you have seen what my body can do. I cannot count the times I have been killed in the past. As long as a single cell lives, so does He Who Waits; though it may take as long as a century to regenerate, my body will rebuild."

That, I thought to myself, is something else I have to figure out how to handle.

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* * *

In twenty-seven days we reached the sea. I had gained muscle, but lost weight, and was feeling very fit despite the lack of certain nutrients in my diet. But for the red hair and light eyes, I might have been Casey's tribesman, tanned as I was and sporting a set of leather clothing he'd made from the skins of our food animals. They smelled a little ripe, but wore better than what I'd started out in.

There we rested for a day, playing in the surf and sand of the nearly tideless seashore. I felt a certain sorrow fill me. To leave this life, and make the transformation back to a civilized being, would not be easy after tasting this. True, life in the wilderness was not easy either, but it was strangely fulfilling. It satisfied my psychological need to find out what was really in me. I was satisfied with what I found. I had the stuff of pioneers. In bygone days I might have been one, seeking fate and fortune in the wild American west or in the harsh beauty of Herschel.

In part, that was my reason for joining the Ecological Service; to see how much of that I could take, without risking all. Now, the work seemed tame. The U.N. was a stodgy bureaucracy, an extension of the old U.S.A., which now dominated planetary government on Earth.

The Earth, poor now in resources, horribly overpopulated, was still man-home. And Earth assumed that the space around her was hers to control, particularly as man had met no challengers as yet. Mudron didn't count. It was a fluke, an old system which experts felt was not really a part of local stellar evolution; its inhabitants were backward, and didn't and never would represent any threat to human supremacy.

The beings who'd built that matter transmitter did. That scared me. They were far and away our technological superiors. They might greet our discovery with resentment, perhaps extermination; who knew?

Casey said they could do something worse: ignore us, as they had his people; pen us up on reservations, leaving us to starve and stagnate. And Casey knew what that was all about.

I found myself feeling a little fear of him, too. Not of the man, but the idea behind the man. Before as we traveled, it had seemed natural for me to be with him, but what of the end of the journey? What would happen then?

To Casey, all other men were as children. He, who had already lived throughout ages eternal, would still be alive and vital when I was dust. He treated me as an equal, knowing that I wasn't, any more than all the others. He trusted me with his secret, speaking freely of his past, concealing nothing. Perhaps this was the greatest wisdom of all. I understand, yet the secret was still safe. Who would I tell? Who would believe a story so fantastic? He could deny everything without saying a word. Silence would suffice, and the rest of the world would assume I was deranged.

I hoped he would never do that to me; that somehow I would find a way to join him in his destiny, here among the stars, if only for a little while. A dream taunted me. In it, we were together. I knew that he had done such things before with other partners, now long gone, and come away each time again a lonely man, without a purpose or the solace of

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a kindred soul to share his misery. Of all the creatures in the universe only he was unique, lacking both siblings and descendants.

"My creator gave me wondrous powers," he told me once, "and many gifts are mine. But that which made me truly a man, he took from me."

It didn't matter. I decided, on that last night on the beach, that the rest of the dream was worth it.

We started south in the morning, this time following a trail of a different sort: the *Wilmington*'s. It was as clear as any path could be, even to me. Until the cradle of the landing web was finished she came down on her spacedrive; a process enormously destructive to the offshore island which served as landing site. The drivefields were tame in space, where matter was scarce, but in an atmosphere their inertial force churned the sky and raised cubic miles of seawater into the air. Each takeoff or landing resembled a small hurricane, but beyond that, as the vessel settled, these forces went to work on soil and crustal rock, fracturing it into powder, which fell to the ground in concentric rings according to its density.

We followed these, taking into account the distance the island lay beyond the great promontory, which itself extended fifty miles to sea. Near its seaward end, on a bay, lay the settlement.

When the net was finished, ships would come down on it, and an array of twenty banks of continuously firing lasers dumping power into the system would lower them slowly into the cradle Solar's crews were building.

One more night was spent out under the stars, there on the sandy lowland. I tried to get back to reality, sifting mental notes of what I had seen so that I could compile a report. I had no written notes or photographs, of course, but I was satisfied I knew what was here; that, except for the aliens, I could have passed this world for colonization. I intended to do so.

"I still do." Suddenly, I found myself burst from reminiscense into reality, and shouting at the boss.

Carmody looked at me critically. He had listened politely while I rambled on. He had not interrupted. He did now, though somehow his manner was softened. "I am here to make that choice, Miss Ryan, though I'll take your recommendation into consideration. Actually, it's become more political than technical now, in view of your discovery of the aliens. Would it surprise you to hear that we'll probably follow it?"

I was surprised, and showed it.

Carmody smiled. "This may be just the break the human race needed: a chance to get a free lunch, to learn from willing teachers. The government'll probably give you a medal, and Casey, too, if they can find him."

"Casey's not likely to be very impressed," I answered. "Now if they made that a necklace of prime serpent's teeth . . ."

"I want to hear the rest of it, Miss Ryan, including all you can tell me about him. Maybe it'll help us find him."

"Okay. Let's see, where was I? Well, needless to say, there was quite a ruckus at camp when we turned up. We walked out of the bush looking like Tarzan and Jane; scared the pants off two guys who

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were goofing off behind a piling at the construction site. We went back to the settlement in their truck, riding in the back because we smelled bad. Meyers himself met us when we got in . . ."

"We thought you were dead," he told us, probably wondering where he'd failed. "I sent search parties out when you didn't return. They found a burned skimmer and we just naturally assumed you'd been in it."

I did the talking. Casey went back to being the dumb Indian. "Well, as you can see, we're all right. All I need is a bath and some real food. We've been eating what Casey shot with his bow."

Meyers had been watching Casey with new respect. "Oh, so that's what it's for." He examined one of the arrows. "Certainly looks deadly." He turned to Casey. "I guess you'd better get back to your regular work."

No, you don't. I wasn't about to let myself out of Casey's sight and protection. "Uh—if you don't mind, Mr. Meyers, I'd like to keep him for a while, if you can spare him. I need him to help me with my report."

"Him? What can he do?"

"I want to pick his brains. I lost all my samples and photographs, and I couldn't take notes on the trail, so my report will have to be composed from memory—mine and his. And as you can see, he's a woodsman. He must have noticed thousands of things I didn't."

There was no credible way Meyers could refuse, though I doubt he bought my explanation, so Casey stayed, and we went back to our old quarters together.

"You shouldn't have done that, Kim."

"Why not? I do need the benefit of your observations. And I need your protection. Did you see the way he looked at your bow?"

"I noticed. But a man like Meyers wouldn't be afraid of a savage, and it's difficult to play Dumb Indian when you make me party to scientific studies. I'd be more effective in the field, where I could keep an eye on things."

"Quit worrying, Casey. Human nature will take care of the problem. We can trust Meyer's prurient mind if nothing else. He'll figure I wanted to hang on to my stud. I'll bet that rumor's all over the settlement by now."

Casey didn't say another word about it. In spite of his vast experience, I guess he still didn't understand women. He settled in with me, and we went to work on a report.

We still needed some information we didn't have, mostly about marine life on Campbell. This provided an excuse for short local field trips, and gave us a chance to reminisce. We spent many days on Campbell's broad beaches or out in a motorboat.

I loved Campbell's mild climate and its friendly sun. "I think," I told Casey, "that I could stay here forever. I really like this."

"Have you forgotten that night in the cave," he replied, "or what we saw in the interior?"

"No, Casey, but I can dream, can't I? It will end soon enough, when my report hits. Then the government will tell us we can't have Campbell."

He was compassionate, and he let me have it a while longer, but there came a day when the dream, too, died. He came back from a sojourn; they had flooded him with innuendos about "his

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squaw," but he had learned useful things.

"It has begun, Kim. Great care must be taken now."

Casey always had a penchant to talk in riddles. It irritated me more than anything else he did. I guess it showed. "What has started?" I demanded.

"Men have begun to vanish. They disappear into the bush around the cradle site."

I was appalled. "If the aliens now existed in sufficient numbers, this might be the beginning of an attack."

"None have been seen," Casey said grimly. "Management has an official explanation, so that the workers do not know. They say that with the web near completion, the missing men have simply taken off, to get the jump on the colonists who will come later. But Meyers knows the real reason."

"How do you know that?"

"The machine shop is making weapons. Lathes turn gun barrels; the smith is making pike heads and short swords. There are armed skimmers patrolling the periphery."

"War, with the aliens?" I saw myself trapped here, perhaps imprisoned or killed, to keep word from getting back to Earth.

"Perhaps. Perhaps not." Casey pondered each phrase. "Meyers may believe he can quietly exterminate the aliens or drive them deep into the bush where they will not be rediscovered. He may bring mercenaries here to hunt them. Certainly he will station marksmen at the transmitter to pick off new arrivals."

"What are we going to do, Casey?"

"For the meantime, nothing. Everything depends on getting you out, unsuspected, when the *Wilmington* returns. I now believe the government must be told, even if we lose Campbell. This is better than interstellar war, which man would surely lose."

We waited, and hoped.

I learned later that Meyers and Bigelow had, in fact, tried extermination; had placed a garrison at the alien transmitter. They succeeded for a while in preventing the formation of large concentrations of aliens, but this did not last. Men still disappeared; amusingly enough, some had run off voluntarily, believing Meyers's explanation for the disappearance of others and determined to get in on a good thing.

Not so amusing were the discussions they'd had about Casey and me, which Bigelow admitted to later; to his credit, he balked at murder, but Meyers thought they could blame it on the aliens if they ever got caught.

I was getting packed to leave while this was going on and didn't suspect a thing, not even when landing day arrived. How Meyers talked Corsetti into doing what he did, I'll never know. Casey and I discussed it later and agreed that even a moron should have known it wouldn't work. But some things are just destined to happen, and I guess it was one of them.

We were on the back porch looking at the sky, watching the great bulk of the ship descend. On the first down-orbit pass she was just a gleaming point of light which moved rapidly over the station. The second pass would bring her down, and we waited for her to reappear in the western sky. She did not.

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"Something's wrong, Kim," Casey told me. He pointed westward.

The air shimmered, and an enormous dust cloud had risen from the ground to race to the top of the atmosphere and flattened out. Then the planet itself started to shake, and there came a series of sonic shocks, followed by a great wind. In the dust cloud appeared blazing halos.

Both of us had seen these things before. It was the awful tumult which accompanies a ship's descent on Aschenbrenner drive, but it belonged on the island, not in the bush to the west.

Casey's eyes blazed. He grabbed my arm and shoved me to the door. "Get inside, quickly," he warned. "Those fools have turned *Wilmington*'s drive on the alien transmitter."

I found myself on the rough floor with Casey on top of me, and started to protest his rough treatment. I stopped when I saw the flash, brilliant like a thousand suns. The fireball singed the settlement as it rose, despite the vast distance; then it dimmed. Through the top of the window I could see it rise toward space.

More shock waves followed; more howling wind. The building shook and rattled but it held together.

One, maybe both of them, went; either the ship's engines went critical or the transmitter did. There might be nothing left of either. Casey let me up.

"What now, Casey? What do we do now?"

This time he didn't have an answer.

Outside, men could be heard shouting, screaming; vehicles roared wildly through the streets, racing engines and squealing tires. We knew that there must have been casualties.

A few minutes later Meyers came and brought two men, both armed with crude, but lethal-looking guns. "Your time has come, Miss Busybody," he said to me.

They herded us off to the brig. The cell looked adequate even to hold Casey.

I sat there on the edge of my bunk, crying. Casey paced.

"I have experience with prisons, too," he said. "There is a way out of all of them."

I was pessimistic. Our cell was essentially a steel box, with walls perforated for ventilation. Its seams were welded, and it was barred and locked from outside, with no openings large enough even to pass a hand. It was also guarded by one of Meyers's gunmen, who sat in a chair outside the door.

After a while Casey came over and sat beside me. "Kim," he said. "I want you to stop that; get control of yourself. That is what I am going to do; understand?"

I hiccuped, and nodded my head. I didn't, really.

"Good," he whispered. "I will need three or four hours, and the result may be quite frightening. Do not allow it to upset you."

"Okay," I shispered.

"In the meantime, keep me covered, but try not to distract me. If anyone comes you must warn me. Is that clear?"

"Clear."

"I am just going to rearrange a few things."

Then he left me and climbed into the other bunk, covering himself with a blanket.

A new guard relieved the first one.

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He came to the door to talk to me, but I told him to let Casey sleep. Soon he, too, settled into the chair by the door.

About sundown, Casey stirred. I watched an arm snake out from under the blanket and rise to grasp its edge. The arm was pink and covered with a light brown fuzz. It rolled the blanket down, revealing a face: one I knew; one I hated. A hand rose to its lips, and Fritz Meyers stood up.

"Rankin." Even the voice was the same. "Get over here."

"Mr. Meyers? How? . . ."

"Never mind; get this door open."

"Yes sir, only . . . what are you doing in there?"

"None of your business, Rankin; the lady and I made a deal. Get the door open."

The lock clicked and the bar slid back. Casey hit the door like a battering ram, driving it into Rankin's face, smashing flesh and bone alike. He crumpled to the floor.

"Come on out, Kim."

I left the cell, still not completely convinced I was looking at Casey.

He shoved Rankin inside, flipping him onto my bunk, and covered him up. Then he reached into his own and withdrew a clump of black substance.

"My own hair," he said. "I can't reconstitute dead tissue. I had to get rid of it and start over. We'll hide this somewhere outside."

"Where are we going?"

"Back to our quarters first, to get our equipment and some food for you. Then into the bush. We'll hide there until contact with Earth is re-established. Meyers has to try to kill us now if we stay, and in your case, death's permanent."

We started out into the compound. It was strangely empty. Then I heard a faint popping, and in the south there was a glow in the sky. It looked like a fire, and I thought I smelled smoke, too. For an instant I was afraid it was our quarters that were burning, but the fire seemed to be farther away. We hurried off in that direction.

Others appeared in the street, scurrying about, some moving equipment in the direction of the fire. Casey called to one of them. The man stopped running and came over.

"What's happening out there, Barker?"

"Mr. Meyers. How—I just talked to you on the phone. How did you get way over here?"

"Never mind. Fill me in."

"Well, okay—you mean the fire? Them things set it, we think. I ain't seen none myself, but they're supposed to be all over. There's gonna be a fight, I think."

"What are we doing about it?"

Barker looked at him as if to say, *Don't you know?* He didn't say that, though. "We got the guys with guns on rooftops, and some in a skimmer. The rest of the men got axes and machetes. We ain't gonna beat fire, though. If they decide to burn us out, we can't stop them."

"You're doing the right thing, Barker. Get back to work."

Barker took off.

"General foreman," Casey explained. "One of the dumber ones. We'd better hurry before the battle really gets started. Barker's right: they can't stop a fire, though I doubt the aliens want to burn up what they them-

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selves hope to get from this raid. Most likely the fire is just a diversion."

We reached our rooms, got what we needed, and left again. I noticed the Meyers form was fading, and commented.

"It takes too much concentration to hold a new pattern, Kim. At least until I really get used to it. On occasion, I've held them for years, the Comte de Rochambeau, for instance. Now there was a role where I had everybody guessing."

I had not seen the mischievous side of Casey before, but this proved he had one.

We made our way out of the settlement, heading west in the direction of the cradle site. Once or twice we stopped and Casey listened for sounds of others moving in the bush, but we encountered neither man nor alien. Casey led us across the lowlands into higher country, and by morning we were high on the spine of the promontory about twenty miles west of the station. He selected a campsite where there was both water and cover, and we rested. That is, I rested. Casey climbed a tree and examined the surrounding countryside with field glasses.

I awoke and ate, while Casey explained our situation. "I see little groups of aliens converging on the station. All are poorly armed. As of now, there are probably not enough of them to overcome the men, but more arrive hourly. Soon they can start a siege, if they can find enough food to maintain one. Still, if the men narrow their perimeter and defend it well they may yet prevail. I think last night's raid was simply a test of human strength."

"Maybe they don't know how many men there are."

"A good point. But neither do the men know the aliens' strength. If the transmitter has ceased to function, their numbers will not grow, but I regard that as a particularly disastrous possibility."

"Why? I should think that would be better for us."

"In the short run, perhaps. But for the race, devastating. If the aliens can detect its malfunction, they may return to investigate and find us. Discovery, I think, is something best postponed as long as possible. In the interim perhaps we will be rescued and obliterate our traces from Campbell."

"Do you think we'll have to go that far?"

"I cannot see the future, Kim."

"We could have a long wait, Casey. It'll be almost two months before the *Wilmington* is even overdue. More time will be wasted deciding what to do, and still more will pass before another ship can get here. What happens to us in the meantime?"

"Nothing, I hope. We will survive it and do what we can to find solutions. There was a time when I thought we might simply get you back to Earth and let the government handle things. Now that won't work. We're out of time. But I wish I had a better insight into this."

I had thought he did, but something apparently still bothered him. I asked him what it was.

"The aliens are inept. That's not typical criminal behavior, at least not for the human criminals I've known. They're not nearly aggressive enough. Even allowing for cultural differences they ought to show more resourcefulness,

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particularly in weaponry. We ought to be seeing some spears along with the clubs, and some concerted effort to get hold of human materials for weapons. The one thing they do seem to rely on is fire; otherwise, they behave like amateurs."

We moved again, farther into the interior, to find a place which, as Casey said, "You and I can defend by ourselves for long enough to bring this business to an end."

He didn't tell me what he meant by that, but he found our redoubt; a cavern halfway up a cliff face overlooking a broad stream. We had brought much food, and the shrubs from the narrow pathway would provide fuel. Inside the cavern was a pool containing more water than we could drink in years. But farther down the valley was a ford, where aliens sometimes crossed, headed for the settlement.

Casey got me settled in, then told me to rest. "Tonight," he said, "you will not close your eyes at all, but you will be safe here until I return. Even you, alone, could hold this place against an army with nothing more than a few rocks and a knife."

When darkness fell he sallied forth, armed only with a staff. I waited in darkness all alone for his return, and all the while fought off the savage creatures my imagination conjured up. Once or twice I felt the bow and wondered, if the need arose, if I could summon the strength to draw it or the skill to find the mark.

With the first light of dawn I heard a noise on the trail below me, and I felt a fright. Casey would move more silently than that. And Casey did. But the lanky prisoner he led, bound tightly and stumbling, had no wish to cooperate.

I stood, watching from the cave's mouth, as Casey dragged it in, and it seemed to me to be in life even uglier and more menacing than the dead one at the other cave, though it was much smaller.

"I chose it for its size," Casey said. "In time, you will understand why. Now I must get to work and learn yet another tongue, so I may speak with it."

And in the days that followed he struggled to master the grunts, the hisses and squeals that made up the alien's speech. I despaired of matching his resolve and left the two alone, preferring to speculate on what was happening to the settlement.

Later, when it was over, I learned that these had been desperate times for Meyers, and had finally driven him to self-destruction. By that time most of the outer buildings had been leveled to provide a clear field of fire for what was left, huddled behind barriers of barbed wire. In two months he had lost four hundred men; not simply killed, but gone, their bodies dragged away by the aliens.

The cairn had not been destroyed, and the *Wilmington* was sacrificed in vain. Aliens still came through, to be cut down by human sharp-shooters mounted in skimmers. Then the aliens ended that; they fired the motor pool. Immobilized, Meyers had sat within his reduced perimeter, along with fifty men who remained, and waited for the end. By that time, Casey had been ready.

Again the secretary broke into my narrative.

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"That's the part I understand the least," Carmody said. By this time he seemed far more mellow; almost human. His haughtiness was gone. "Perhaps if we could find Kah-sih-omah . . ."

"Casey doesn't want to be found, Mr. Carmody. Don't you see—if he doesn't, he won't be. And until he does turn up this is only a story; a myth, both to us and the aliens." *But he was more than that to me,* I thought. And the thought was painful.

"I want to hear the rest of it, Miss Ryan, especially the ending."

"I suppose that's the part that really matters most of all," I replied.

"I wasn't in on much of it. All I really know was pieced together later, from people I talked to. A lot of my information comes from Bigelow, and has to be considered less than reliable. And I'm sure the aliens don't suspect a thing.

"It all started one morning when I woke to find the message, scratched in the sand at the cave mouth. Casey and the alien were gone. By that time, of course, Casey was fluent in the alien speech and . . ."

"What was the message?" Carmody interrupted.

"It didn't make sense, Mr. Carmody. It was only three words. I couldn't really make it out." I lied. "Anyway, Casey was gone, and after that things started happening at the settlement.

"Meyers had succeeded in holding on as long as the aliens simply besieged him, and he was able to fight off their night raids with superior tactics and weapons. The aliens couldn't mount a direct assault.

"Then, suddenly, the aliens brought up trebuchet and used them to reduce the buildings. Meyers shot himself and Bigelow took over. He had guts; I'll give him that, going out to parley with the aliens. You pretty well know the rest."

Carmody did, though he wasn't quite sure how to handle it from there. I wasn't either, and I said so. I found it awkward, but didn't say so.

"I'm leaving you in charge, Miss Ryan, while I go back to report all this. Somehow, I can't see the government abandoning Campbell over this; not with all this knowledge available for exploitation. I think we'll get the landing web finished in record time now. There'll be all kinds of people coming in. In the meantime you'll have to keep things stable here. I hope you get along all right with the native leader."

"Yes," I said. "We understand one another. His English seems to be pretty good."

"Fine. Then I won't worry about a thing." He rose from the chair and motioned for me to follow him down to the dock. "This'll mean a promotion for you, you know. Maybe even to an advance scout team. Would you like that?" He had my written report in his hand, and patted it lovingly.

"Yes, if I could get the right partner; yes, I think I would."

He climbed into the launch and I watched it leave, until at last the image became too small, and disappeared over the horizon.

He hadn't had time to read the report, that I knew. When he did, he would find no reference in it to the extraordinary powers Casey had displayed. So

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far as that part of the story was concerned, it would remain a myth.

EPILOGUE

The alien entered the room and sat down in the chair beside me, its legs bent awkwardly, arms resting in its lap. I looked no more than necessary at its face, which appealed to me not at all, though I knew what lay behind it. Instead, I looked away and said, "When, Casey. How much longer?"

"Shh. Not so loud." He raised an arm, but I retreated. I would not allow it to touch me.

"There are," he said, "grave disadvantages to my present form, but until the job is done it is necessary. I grow used to it and it has become easier to hold. Tell me, Kim, how did your interview go?"

"Better than expected, I think. Carmody appears to be a very prudent man. He will have my report and read it as he travels back to Earth. He believes the aliens can be exploited."

"So do I, and I believe that they will permit this willingly, in the hope that we can someday aid their fellows."

"For all we know, they may really be criminals."

"No. Not in the sense you mean. And we do know, in general, where they originate: from farther in on the spiral arm. Their home systems are in foment. They are what they claim to be: political refugees. They are politicians, philosophers, scientists, writers, artists, and the like; anything but criminals, and certainly not soldiers. This is why I had to lead them and teach them to make war. They could not even bring themselves to kill, but simply captured humans and dragged them off, often with heavy casualties to their own.

"And they don't want Campbell; at least, not in the sense we do. Their government simply dumped them here with nothing, to fend for themselves on what they thought was a vacant world. These people embarrassed them.

"To us, they can be partners. We can trade them sustenance for knowledge. The matter transmitter alone is worth that. Spaceships will always be needed for exploration, but commerce needs something better to be really worthwhile. It will make colonization really practical too, and you know what that means."

"We will need many more new worlds."

This time I did not avoid his touch. I knew also what the message meant, that still I pictured scratched in the sand. He Who Waits had found a companion "For A Time." ■

● Why explore the Universe? It is almost ironic that we should have to ask this question because it is almost as though we have to apologize for our highest attributes...we went to Mars, not because of our technology, but because of our imagination.

Norman Cousins

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Jay Kay Klein's biolog

The archetypical *Analog* story revolves around an engineer in combat, usually against some refractory fact of nature, but often against sheer arbitrary nonsense perpetrated by accountants and lawyers. To Joseph H. Delaney's way of thinking, though, it is the gladiator-at-law who ensures the proper regulation of social machinery constructed by humans to permit individuals to operate as free agents. Democracies won't work without lawyers, he says, but dictatorships will.

Former editor and engineer John Campbell is credited with opening science fiction to stories about the social sciences and human interactions. Physicist Stanley Schmidt has continued that tradition. When Joe took exception to some law-oriented stories that had appeared, editor Schmidt suggested he try one. The result was Joe's first published story: "Brainchild," which appeared in the June 1982 issue. A second appeared three-and-a-fraction months later, and *more are on the editorial calendar.*

Raised on a farm in southern Illinois, Joe moved to Joliet, Ill., at age 12, just about coincident with the start of a lifelong addiction to science fiction magazines—which at first had to be hidden from his parents. Missing military service in WWII because of extreme youth, he was whisked off a bit later for police duty in Korea. An LL.B. from Mt. Vernon Law School in Baltimore followed. Ten years of hand-to-hand courtroom battle ensued in Maryland, then another ten in Joliet. He moved to Corpus Christi, Texas, six years ago, where it is not only sunnier but slower-paced, leaving time for writing. And just a few months ago he decided to close his law office, to devote full time to writing.

Joe's first-draft manuscripts might possibly be unique among practicing science fiction writers; they are composed on yellow legal pads in longhand. However, when you go behind the legal facade and get at the person, you find that he is far from unique among science fiction writers. In fact, his home workshop sounds almost exactly like that of the most archetypical of engineering-oriented writers, the late George O. Smith. Joe likes to make things, usually out of metal. He owns founding, smithing, and metal-shaping equipment. Some of the machinery he built himself. Among his self-designed projects were a windmill and any number of steam-driven engines. When a Delaney character uses a mechanical device or weapon, space drives and blasters aside it is something the author has made or could make himself.

John Campbell was always looking for the underlying rules by which nature could be manipulated for man's benefit. He even helped create some of the most interesting and offbeat fantasy with a search for the rules and regulations underlying magic. It's Joe's contention that man should understand and follow the rules and regulations developed by thousands of years of human experience and especially those innovated by Western civilization. It is to this end that he writes about lawyers as social engineers. ■

Joseph H. Delaney

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ON GAMING

Dana Lombardy

Want to control a starship? . . . Join a party of adventurers to find hidden treasure guarded by strange monsters? . . . Meet the people responsible for translating a novel like *Dune* into a game and learn more about how they did it? All this is quite possible, and it may be available very close to you sometime this year—at a game convention.

If you've got any interest in SF games, fantasy games, or historical wargames, a convention can be a great place to become more exposed to the hobby. Not only can you see a wide variety of games at one of these events, you can also meet like-minded people who are looking for partners and opponents. This can be especially important with role-playing games, in which a good referee is needed. During a weekend convention, you may make valuable contacts that will help you with gaming the rest of the year.

The oldest annual game convention is the GEN CON® Game Fair, which was first held in Lake Geneva, Wisconsin, in 1967. It's now under the supervision of TSR Hobbies Inc., makers of the *Dungeons & Dragons*® role-playing game. The show includes lots of fantasy and SF role-playing tournaments and events, seminars, painting demonstrations, more than forty manufacturers displaying their summer releases, and a special program for new gamers (first attempted last year with much success). The 16th GEN CON® Game Fair will be held Thursday through Sunday, August 18-21, at the University of Wisconsin's Parkside campus in Kenosha.

The second largest game convention is Origins, which was first held in Baltimore, Maryland, back in 1975. Origins travels from city to city each year, and includes many of the same types of events as GEN CON®, but with somewhat more emphasis on historical wargaming. Nearly 50 different manufacturers, including computer game software publishers, display their summer releases at Origins each year. In addition, the H.G. Wells and Charles Roberts categories of awards for role-playing games, board games, and gaming miniatures are given out at Origins in a special ceremony sponsored by the Academy of Adventure Gaming Arts & Design. The ninth annual Origins will be held at Cobo Hall convention center in downtown Detroit, Thursday through Sunday, July 14-17.

Here are twenty other 1983 conventions for which dates have been confirmed as of press time. Just to be on the safe side, write first before going to a convention. Although it doesn't happen often, dates and locations can change. Make your plans, and enjoy your gaming!

March

4-6 *Microcon 83* (San Marcos, Texas). Info: Microcon, 601 River Road #604, San Marcos TX 78666.

5-6 *CentCon I* (New Britain, Connecticut). Info: Ron Vincent,

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471 Commonwealth Ave., New Britain CT 06053

5-6 *West Point Con* (West Point, New York). Info: Dave Sutter, Box 2998, West Point NY 10997.

11-13 *GEN CON® South Game Fair* (Jacksonville, Florida). Info: GEN CON® South, Box 756, Lake Geneva WI 53147

18-20 *Fantasy Worlds Fair* (Berkeley, California). Info: Lisa Waters, Box 352, Berkeley CA 94701

19 *Emperor's Birthday* (Elkhart, Indiana). Info: Robert Haggerty, 525 Middlebury #302, Elkhart IN 46516

26 *Old Colony Historical Miniatures* (Brockton, Massachusetts). Info: Old Colony Wargaming Society, Box 1878, Brockton MA 02403

25-27 *Nova 8* (Rochester, Michigan). Info: Nova, Order of Liebowitz, Oakland Center, Rochester MI 48063

25-27 *Fantasy Fair* (Tonkawa, Oklahoma). Info: North Oklahoma Dungeoneers, Box 241, Ponca City OK 74602

April

9-10 *Spring Revel* (Lake Geneva, Wisconsin) Spring Revel, Box 756, Lake Geneva WI 53147

22-24 *Contretemps* (Omaha, Nebraska). Info: Contretemps, Box 12422, Omaha NE 68112

May

20-22 *CWI Spring Con* (Chicago, Illinois). Info: Chicago Wargaming Inc., Box 217, Tinley Park IL 60477

20-23 *Can Games* (Ottawa, Ontario). Info: Can Games, Box 3358, Station D, Ottawa, Ontario, Canada K1P 6H8

June

4-6 *Dallcon* (Dallas, Texas). Info: Dallcon, Box 345125, Dallas TX 75230

10-12 *X-Con* (Milwaukee, Wisconsin). Info: X-Con, Box 7, Milwaukee, WI 53201

24-26 *Atlanticon* (Baltimore, Maryland). Info: Atlanticon, Box 15405, Baltimore, MD 21220

July

14-17 *Origins 83* (Detroit, Michigan). Info: Metro Detroit Gamers, Box 787, Troy MI 48099

22-24 *Flying Buffalo Con* (Phoenix, Arizona). Info: Flying Buffalo Inc., Box 1467, Scottsdale AZ 85252

August

18-21 *GEN CON® XVI Game Fair* (Kenosha, Wisconsin). Info: GEN CON® XVI Game Fair, Box 756, Lake Geneva WI 53147

September

24-25 *Games Day 83* (London, England). Info: Games Workshop Ltd., 27-29 Sunbeam Road, London NW10 England. ■

Editor's Note: "On Gaming" readers and product manufacturers who wish to contact Dana Lombardy may address mail to: 8418 McKenzie Circle, Manassas, Virginia 22110.

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brass tacks

Dear Stan:

Your editorial in the current (October) issue sparked an interesting train of thought.

There have always been inventions that were made out of their time. The list stretches well back into antiquity. I'm particularly reminded of an 14th-century English monk who apparently cobbled together a hang glider and flew a respectable distance before losing control and crashing. (For that matter, I've always had my suspicions about the Icarus legend.)

More recently, there was a Frenchman who made a brief flight in a jet plane before the first world war. The flight was brief because he mounted his new engine in the nose of the plane where an engine was "supposed" to go, and counted on a smoothly curved baffle to carry the exhaust away from the wood-and-fabric fuselage. Instead, the exhaust flow clung to the baffle and set the plane on fire. Today he is best known for naming the phenomenon that destroyed his aircraft—the Counde Effect.

During his editorship of the magazine, John Campbell published a couple of reports of ideas that were well ahead of their time. One involved a device that was recognizably a transistor patented back in the '20s.

Just why an important idea or invention will lie dormant for years or even centuries is an interesting question. Sometimes, of course, the concept is just too early, but I suspect that's rather rare. I have an article coming out soon in another magazine on Charles Babbage and his attempt to build a mechanical digital computer in the middle of the 19th century. One of my conclusions is that Babbage's Analytical Engine would have worked if he'd ever quit designing the thing and gotten

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around to building it. Sitting here at the screen, I have a hard time coming up with concepts (as distinct from applications) that couldn't have come much earlier than they did.

More often, there is no need for the technique, or in its early stages there are other things that can do the same job better. Babbage's Analytical Engine fell victim to the first problem. Serious work on digital computing machinery didn't begin again until the second world war, when the need for firing tables for artillery made some sort of mechanical computation nearly mandatory. The transistor that Campbell reported on had the second problem. It just wasn't as good as the competing devices.

That period of dormancy is more deadly to a device or an idea than never having been discovered at all. The discovery is made, dismissed as not very useful, and then rots in the references for years. All the workers in the field either know about it or turn it up on their first literature search. But no one pursues it because it isn't a frontier of knowledge. It's just another trivial backwater.

And because it's a trivial backwater, it isn't widely publicized outside the field. Most of the people who are knowledgeable in that area have heard of the "Murfitz Effect," but it is likely to be decidedly obscure outside the field—which, in the nature of things, eliminates ninety percent of the people who could see how to make it the next breakthrough.

When the Great Discovery is finally made, there are usually a lot of researchers kicking themselves because they've known the basic concept all along.

That's the first reason major concepts can languish even after they have become technically practical. Our system of scientific compartmentalization keeps "unimportant" ideas from becoming widely known.

The other problem is more subtle and just as deadly. Unless the intellectual climate is right—or, to put it another way, the vision is there—the concept's potential will simply be ignored.

What do you suppose would have happened if you had gone to Dr. Franke in, say, 1958 and said you wanted to do work on holograms? As you pointed out, the basis of the field was well established, even if lasers didn't exist. Let's even suppose the thing that sparked your interest was stumbling across the French reference you mentioned. Unless Dr. Franke was a very unusual teacher and you were attending an even more unusual university, I doubt you would have gotten the support you needed to do the work. The concept was there, the potential was there, but the vision would have been missing.

Which brings me to science fiction.

As you pointed out in your editorial, conducting a literature search for significant but underappreciated ideas is an enormous job. The amount of dross that would have to be sifted just to turn up a few worthwhile nuggets makes the idea prohibitively costly from a conventional standpoint.

On the other hand, that's what science fiction authors do all the time. Not only do they go looking for those odd-but-interesting pieces of scientific trivia, but they build stories around them. In effect, those stories are teaching aids and mnemonics for those concepts. They communicate them to a very broad audience.

They also help supply the vision necessary to move forward with those concepts. They help create an intellectual climate that makes an idea or an application more acceptable. This is more a

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matter of osmosis than conscious influence, but it is very real none the less. It helps explain why we sent an elaborate experiment to detect life to Mars even though we were ninety percent sure the planet was dead by the time the probe was launched.

The science fiction authors don't care whether the concepts they dig out are workable or not. All they require is plausibility. It's for others to read those stories, ponder what they have presented and, perhaps, go forward with the research.

In a sense, you are doing what *Scientific American* and other science magazines do. But *Analog* does it first and more freely because the scope allowed is broader.

That's one of the reasons I subscribe.

RICK COOK

Box 15193
Phoenix AZ 85060

Dear Editor:

Re: Publishing a novel excerpt . . . Mixed but positive feelings. I enjoyed the excerpt from *The Descent of Anansi*, but how frustrating to have to wait for paperback or library availability! I would love to have this serialized. Thanks for an intro to a promising (if not excellent) novel.

ELISABETH ELDRED

Seattle WA

Analog Editor:

You asked for responses to *Analog*'s new idea of printing novel excerpts. Here is mine.

I deeply resent this new policy. I feel I have been betrayed by a magazine staff I have trusted for years. I feel I am being set up for the benefit of some publisher . . . being lured into a trap. Presumably to make money for someone.

I also have no intention of ever starting to read a story when the ending is unavailable. I did that once, years ago . . . suffered the frustration of never finding the rest of the novel . . . and will never, never, never again expose myself to that frustration.

As you can see, I have deep feelings about this topic . . . all strongly negative. My feelings of entrapment are so strong that I will cancel my subscription to *Analog* if this continues. Not to punish you, but to protect me. So I will never inadvertently start reading a book excerpt, then feel the jaws of the trap biting into me.

ELIZABETH DAVIS

924 Union St.
Stevens Point WI 54481

We got lots of letters, spanning the spectrum between these two, but the general consensus was that we should run stories in their entirety or not at all. That's what we plan to do in the future. As I explained earlier, the excerpt we ran was a special case prompted by special circumstances which should not recur. It does not *represent a new policy, but it seemed a good chance, since we were doing it once anyway, to collect your opinions for future reference. Thanks for your help.*

To whom it may concern:

I am currently editing a collection of essays and talks by Frank Herbert. I am trying to obtain tape recordings of lectures and talks Herbert has done on any subject, for transcription and possible inclusion in the collection. Please call (collect) 617-527-4210 or write to:

TIMOTHY O'REILLY

171 Jackson Street
Newton Center, MA 02159 ■

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BALTICON XVII (Baltimore-area SF conference) at the Hyatt Regency Hotel, Baltimore, Md. Guests of Honor: Catherine Crook and L. Sprague de Camp; Fan Guests of Honor—Eva Whitley and Jack Chalker. The usual programming, panels, talks, etc. Masquerade Saturday night. Registration—$12; children 7–12 $6; children to age 6 free. *All registration in advance—no at-door memberships*. Registration will be limited to 1,500. Make checks payable to Baltimore Science Fiction Society. Info: Balticon 17, Box 686, Baltimore MD 21203.

1–4 April
ALBACON II (34th British SF Convention) at the Central Hotel, Glasgow, Scotland. Guest of Honour—James White; Special Guest — Tanith Lee; Fan Guests of Honour — TAFF and GUFF winners. Registration — £9 until 20 March 1983. Info: Albacon II, c/o B/L 8 Highburgh Road, Glasgow G12 9YD, Scotland, U.K.

1–3 April
MINICON 19 (Minnesota regional SF conference) at Radisson St. Paul Hotel, St. Paul, Minn. Guest of Honor—Larry Niven; Fan Guests of Honor—Pamela Dean and David Dyer-Bennett. Info: Minicon, Box 2128, Loop Station, Minneapolis MN 55402.

22–24 April
PENDULUM (SF/Doctor Who conference) at Holiday Inn, Ottawa Centre, Ontario. Guests—C.J. Cherryh, Lynn Abbey, Robert Asprin, etc. Video, gaming, costuming, etc. Registration—$13 until 16 April 1983, $15 at door. Info: Pendulum, Box 4097, Station C, Ottawa, Ontario K1Y 4P3, Canada.

22–24 April
Con*Tretemps (Nebraska-area SF conference) at New Tower Inn, Omaha, Neb. Guest of Honor—Gordon R. Dickson; Fan Guest of Honor—Gay Haldeman; TM—Rusty Hevelin; Special Guest—Joe Haldeman. Games, video, panels, dealers, etc. Info: Contretemps, Box 12437, Omaha NE 68112 (include s.a.s.e.) Supported by the Nebraska Arts Council.

23 April
HUMANICON I (New Hampshire SF conference) at the Salem Inn, Salem, N.H. Guest of Honor—Frederik Pohl. Info: Carol Morrison, 20A Gordon Dr., Londonderry NH 03053.

24–27 April
1983 Popular Culture Association National Meeting at Wichita, Kan. The Science Fiction/Fantasy Area will hold an academic meeting there. Info: Thomas J. Remington, SF/F Area Chair, 1983 P.C.A. National Meeting, English Department, University of Northern Iowa, Cedar Falls IA 50614.

1–5 September
CONSTELLATION (41st World Science Fiction Convention) at Baltimore Convention Center, Baltimore, Md. Guest of Honor—John Brunner; Fan Guest of Honor—Dave Kyle; TM—Jack Chalker. Registration—$15 supporting at all times. Attending—$40 until 1 July 1983, more at the door. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: ConStellation, 41st World Science Fiction Convention, Box 1046, Baltimore MD 21203.

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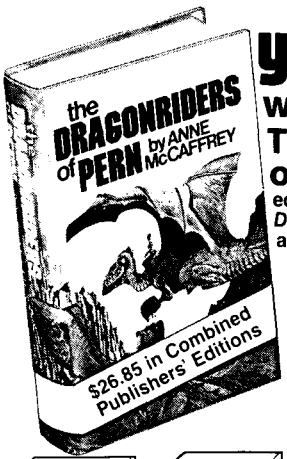

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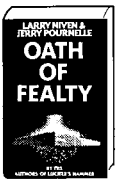

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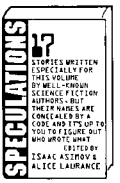

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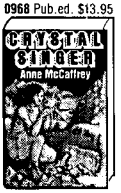

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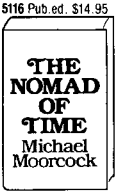

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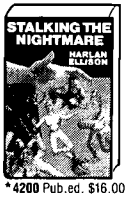

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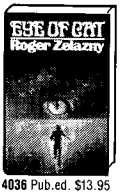

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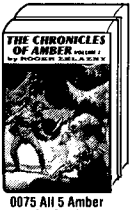

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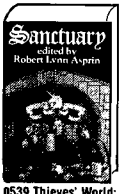

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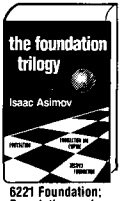

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